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### *ELECTRIC RAILWAY TRACTION*

*A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.*

### A Well-Deserved Honour

IN the list of Birthday Honours none is better deserved than that of Mr. H. N. Gresley, Chief Mechanical Engineer ("and speeder-up," as *The Times* appropriately adds), of the L.N.E.R., and this year's President of the Institution of Mechanical Engineers. Since Mr. Gresley assumed direction of the whole of the mechanical department of the old G.N.R. 25 years ago, his policy has placed in the hands of the traffic department an efficient tool maintained by him always in first class condition. From his predecessor, the late Mr. H. A. Ivatt, he inherited the big boilered engine, an inheritance he has judiciously developed, all the heavy-duty locomotives of his design having been equipped with that essential to reliable and efficient performance. Among the more outstanding railway developments that owe their origin to Mr. Gresley may be mentioned the corridor tender which, by enabling enginemen to be relieved on the way, made possible the 392-mile non-stop run of the Flying Scotsman between London and Edinburgh, and the high-speed streamlined Silver Jubilee express, which averages 70½ m.p.h. over the 232-miles non-stop between London and Darlington—both world records. Mr. Gresley has profited by research, and while conserving what was well tried and good, has adopted anything new that seemed likely to make for improved efficiency. This principle he has observed in all his works, whether connected with rolling stock or any other branch of railway mechanical engineering. For consistent ability to tackle any job, however heavy the load, high the speed, or abnormal the conditions, and to deliver the goods (or passengers), commend us to the Gresley locomotives of the L.N.E.R.

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### Broadcasting the Railway

Every Tuesday evening, at 9 p.m., a railway talk is broadcast from 3DB the principal broadcasting station in Melbourne, Australia. A portion of the fifteen minutes so occupied is devoted to "peeps behind the scenes," and descriptions have lately been given of how a timetable is prepared; how traffic was handled at the Royal Show; the life of a railway sleeper; tickets; and many other details of railway working and equipment. "These interesting sidelights on the Railway Department's operations," says the *V.R. News Letter*, "combined with the brightly-written publicity matter and the carefully-selected music, provide splendid entertainment for the public and railwaymen as well." The railway system in Victoria is, of course, State-controlled, and the deft insertion of publicity into the broadcasts is thereby explained. But apart from this, the almost entire absence from the programmes of our own British Broadcasting Corporation of any reference to railways does, by comparison, show an extraordinary lack of appreciation of what, to the public at large, might be made a subject of exceptional and many-sided interest. Children, in particular, are for the most part extremely keen to know all that there is to be known on what, judging by the patronage given to railway works excursions, and the spate of railway books for "boys of all ages," is to most of them an enthralling topic. Many members of the public, also, would welcome the opportunity of hearing at first-hand what goes on behind the scenes in one of the greatest of our national industries.

* * * *

### The Week's Traffics

Last week's traffics of the four amalgamated companies compare with those for an ordinary week in 1935 and may be regarded as satisfactory. The percentage increases to date are better than those at the end of the previous week on the L.M.S.R. and Southern and are practically unchanged on the L.N.E.R. and Great Western. For all four companies the gross earnings for the 25 weeks of the current year amount to £70,576,000, an increase of £1,881,000, or 2·74 per cent., compared with 2·69 per cent. at the end of the 24th week.

| | 25th Week | | | | Year to date | |
|---|---|---|---|---|---|---|
| | Pass., &c. | Goods, &c. | Coal, &c. | Total | Inc. or Dec. | |
| | £ | £ | £ | £ | £ | % |
| L.M.S.R. .. | + 11,000 | + 42,000 | + 6,000 | + 59,000 | + 951,000 | + 3·42 |
| L.N.E.R. .. | + 3,000 | + 7,000 | + 14,000 | + 24,000 | + 557,000 | + 2·73 |
| G.W.R. .. | + 6,000 | + 5,000 | − 1,000 | + 10,000 | + 272,000 | + 2·38 |
| S.R. .. .. | + 12,000 | + 2,500 | + 2,500 | + 17,000 | + 101,000 | + 1·12 |

The increase to date is made up of £145,000 from passenger train traffic, of £1,139,500 from merchandise, and of £596,500 from coal. In merchandise the L.M.S.R. leads with an advance of £652,000, and in coal the largest increase is that of £254,000 shown by the L.N.E.R. The best passenger train traffic gain is the £63,000 of the L.M.S.R. London Transport receipts for the past week show an increase of £22,100, and for the 51 weeks an increase of £373,500.

* * * *

### Riccarton: The Isolated Cheviot Railway Village

Among the Cheviot Hills in Roxburghshire, five miles from the Border of Scotland and England, Riccarton, a village of about 150 inhabitants, is without ingress or egress by road. Though lacking policemen, church, and

doctor, it is a railway junction with Locomotive and Engineer's Depots on the L.N.E.R. main line between Edinburgh and Carlisle, 14 miles south of Hawick. The junction is with the Border Counties line—the Riccarton and Newcastle branch. Riccarton owes its existence and maintenance to the railway; there is no other employment for the people whose 35 dwelling houses are the property of the L.N.E.R., and the one villager who has no direct railroad interests is the schoolmaster. Many years ago financial aid from the old North British Railway Company enabled the people to open a co-operative store, and the railway built a village hall. Every Sunday the railway company provides, free of charge to its employees and their families, a special train to convey the people to and from church. The train runs alternately to and from Hawick and Newcastleton. When running to Hawick and back the train calls at Whitrope Summit for the convenience of railwaymen and their families resident at that part of the line, and as there is no platform, travellers board and alight by wooden steps. When a doctor is required in the village he has to travel by rail from Hawick or Newcastleton (the latter eight miles away) and in urgent cases a locomotive is requisitioned to bring him. Annual engine passes are consequently granted by the railway company to the doctors concerned.

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## Ceylon Government Railway

A serious decline in the revenue receipts of the Ceylon Government Railway during the year ended September 30, 1935, could not be made good by savings in ordinary working expenditure, and there was an actual loss on working. Unrestricted road competition accentuated by the advent of the diesel-engined road vehicle, the malaria epidemic, and the embargo placed upon the transport of grain in the areas affected by continued drought and consequent failure of crops were the principal causes of the fall in revenue.

| | 1934–35 | 1933–34 |
|---|---|---|
| Passengers .. .. .. | 10,217,300 | 11,476,539 |
| Merchandise, tons .. .. | 988,484 | 1,082,402 |
| Train-miles .. .. .. | 4,205,212 | 4,243,644 |
| Operating ratio, per cent. .. | 101·35 | 89·44 |
| | Rs. | Rs. |
| Passenger receipts .. .. | 6,547,579 | 7,941,379 |
| Merchandise receipts .. | 9,962,611 | 10,721,003 |
| Gross revenue .. .. | 18,273,081 | 20,980,422 |
| Ordinary working expenses.. | 18,520,001 | 18,765,156 |
| To renewals fund .. .. | 391,325 | 178,000 |
| Net revenue .. .. .. | Dr. 638,245 | 2,037,266 |

Interest charges of Rs. 6,378,605 bring the total deficit for the year under review to Rs. 7,016,850. It is proposed to import three diesel-electric trains and two diesel railcars for service on the Coast Line during the present year and a close study is being made of recent developments in the design of diesel-engined vehicles and their operation on various railway systems in other countries.

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## A German Railway Artist

There died not long ago in Germany an artist, Hans Baluschek, who had for many years devoted himself largely to paintings and drawings of railway subjects. Born at Breslau in 1870, the son of a land surveyor who, urged by the tendency to railway speculation and building, had gone into the contracting business, only to lose heavily by it, he early felt a peculiar attraction to railways and as a schoolboy spent hours watching the trains and making friends with the Breslau station staff. Young Baluschek, gifted in no mean degree, was soon producing creditable drawings of railway scenes, and eventually, after studying at Berlin, became a professional artist. His ambition was to represent locomotives, rolling stock, signals, and other items of railway equipment with a technical accuracy that would be above criticism. He succeeded in a remarkable manner, to judge by some reproductions published recently in *Der Eisenbahnfachmann*, and in a Reichsbahn centenary volume of railway incidents and verse, illustrated by his sketches bearing his fine picture, "Above the House Tops" (which we reproduce on page 1210) on its cover. This depicts an approaching express on a viaduct spanning an industrial district, the publication being issued by the Reichsbahn Commercial Department. The German railwaymen are fortunate in having had so faithful an interpreter of their everyday activities.

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## The Signal Engineers at Liverpool

The choice of Liverpool for the summer meeting of the Institution of Railway Signal Engineers (see page 1219) was abundantly justified. Mr. W. S. Roberts, the President, has long been associated with the life of that city, where his own undertaking is situated, and the respect and affection he has earned for himself there emerged very clearly in the course of the proceedings. The willing co-operation he could command resulted in the admirable facilities which enabled the party to make the best use of the time available. The only departure from programme was the inability through illness of Sir Harold Hartley to preside at the luncheon to which the institution was entertained by the L.M.S.R. His place was taken by Mr. Ashton Davies. The Deputy Lord Mayor, Alderman Richardson, and Mrs. Richardson were kindness itself at the civic reception and the dinner. All the signalling installations inspected presented points of special interest, particularly on the Mersey and Overhead lines. It occasioned some regret, however, to see how the traffic has declined on the latter, due to a combination of causes, and one cannot help hoping that something may happen to improve it again and lessen the anxieties of Mr. Box and his board. Liverpool owes much to the Overhead, and we trust a way to greater usefulness will once again be found for it.

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## Rail-Air Tickets in France

Since June 1 arrangements have been in force between the French railways and Air-France for the issue of tickets to travellers making journeys partly by train and partly by aeroplane. The scheme, which at present applies only to journeys wholly in France, or to Algeria, Tunis, and Morocco, has a flexibility which should lead to the most rational use being made of the potentialities of both forms of transport. In its simplest form, it enables passengers to take separate return tickets by rail and air at all important railway stations. For instance, Cherbourg can issue a rail return to Paris, and an air perform a similar service, being now in a position to issue the necessary reservation of the air liner seat. Airports perform a similar service, being now in a position to issue railway tickets. Another facility consists of return tickets available by either medium of transport outwards or return, allowing the reduction on each single journey which would be granted if a return by either medium throughout had been purchased. Also, holders of air returns wishing to come home by train are allowed a refund of the difference between half the return fare by air and half that by train for whichever class is used. A supplement similarly calculated is payable by railway travellers returning by air. The remaining convenience to be noticed is the issue of tour tickets allowing successive stages of the journey to be made by rail and air.

### Reorganisation of the Netherlands Railways

A Bill is now before the Netherlands Parliament for the reorganisation of the railway system of that country, involving the winding up of the existing Hollandsche Yzeren Spoorweg Mij (Holland Railway Company) and the Mijtot Exploitatie van Staatsspoorwegen (Company for working the State Railway) concerns, and the formation of a new company to be known as the N.V. der Nederlandsche Spoorwegen (Netherlands Railways) with a capital of 10,000,000 guilders (about £1,300,000); the State is to be the only shareholder. It may be remembered that though the railway system in Holland is worked as a single entity and known as the Netherlands Railways, it is actually in the hands of these two companies. The existing companies' bonds, valued at over 400,000,000 guilders (about £55½ million), would be converted into 3 per cent. State bonds if the Bill were passed, and, to unburden the railways of their over-capitalisation, totalling 230,000,000 guilders, the Government would hand over the State Railways to be incorporated in the new company, at a book value of 100,000,000 guilders, in return for the 10 million worth of shares. A sum of 90,000,000 guilders would therefore be available for writing off depreciation, and the Government would be able to exercise a closer control by the appointment of directors to represent it.

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### The Woodford and Hinton Accident

We summarise on page 1220 Lt.-Col. Woodhouse's report on this accident, referred to already in an editorial note in our issue for May 22. The guards were so hurt and shaken by the collision that it was two months before they could give their evidence. The slip guard was indeed lucky to escape with his life, being right in front and seeing nothing of the train before the impact occurred at some 20 m.p.h. Steam accumulating and concealing the train practically introduces the same risk as fog, when, of course, slipping is not undertaken. The cock on the train being left or knocked open, the brake application was so strong that the driver could not overcome it with the large ejector. He thought the slip had not been made, and that the guard was trying to make him stop in the station. For this reason he did not whistle. Steam had concealed the guard's hand signal. Hand signals are satisfactory when they can be seen, but with steam traction there is always some risk of their being obscured. This is one reason why the old Brighton line slipping arrangements appeared to us in advance of most, the Stroudley electric bell communication between guard and driver enabling the former to send any message required and the latter to know for certain if the slip had been made without reliance on hand signals.

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### The Bulgarian State Railways

A fertile field for study both to those interested in the history of railway development and to those whose interests lie more in the direction of present operation is offered by the Bulgarian State Railways, which form the subject of a brief survey published on page 1204. The interest at the present time lies in watching the adaptation of a comparatively poor permanent way to new conditions of traffic and to the very fine locomotive stock which has been acquired during the post-war period; in observing the growth of new construction to meet the needs of new conditions; and in examining the admirable organisation which—no doubt under the friendly and watchful eye of King Boris—has been built up in the face of many economic difficulties. The features of the history of the Bulgarian railways are the remarkable series of frontier changes which have taken place in and around modern Bulgaria since the construction of the first line in 1866, and the consequent economic and political stimuli which have been responsible for the gradual growth of the railway network of the Balkan Peninsula as a whole, and of Bulgaria in particular. Throughout, two opposing factors are to be observed. The first is the realisation of the civilising and wealth-producing influence of railways in general and the consequent desire for the development of a railway network, and the second is the financial poverty of the country, resulting in foreign loans and foreign builders. A third factor of importance is that, since Bulgaria is essentially a nation of peasant-farmers, from almost the earliest times State rather than private enterprise has been dominant in railway development, and at present the entire railway system of some 2,000 miles is owned and worked by the State.

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### Safety of American Railway Servants

We have already recorded the fact that there was no fatal accident to a passenger on the railways of the U.S.A. in 1935, and now a report for the year by the National Safety Council shows that over sixty railways attained the same record with respect to their employees. The council's report for 1934, when the winner in the group of companies with 50 million or more man-hours was the Chicago and North Western, was reviewed in our issue of August 9 last. For 1935 the award goes to the Chicago, Milwaukee, St. Paul, and Pacific, which has reduced its casualty rate by 87 per cent. since the first award of the National Safety Council was made in 1927. On that occasion the railway was bottom but one in its group. For all railways, the casualty rate in 1935 per one million man-hours was 6·79, or lower than in any previous year for which the record has been kept. Fatalities were 535, compared with 1,866 in 1923. It is estimated by Dr. C. H. Watson, President of the council, that in 12 years there has been a cumulative saving of 4,000 lives on the American railways. He adds that of the 5,107 fatalities in 1935 involving persons other than employees or passengers, 4,932 were either trespassers, or motorists at level crossings.

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### Residual Stresses in Arc-welded Joints

Theory, although essential in engineering research, is of little more than academic value unless the results can be applied industrially. This is the failing of a paper entitled "Residual Stresses in Arc-welded Joints" by N. S. Boulton and H. E. Lance Martin issued by the Institution of Mechanical Engineers. The authors carried out experiments on two steel plates each about 9 ft. × 6 in. × ⅜ in. The first was supported on one of its long edges, and a run of metal deposited on the other long edge, in the usual downward welding position. The second was placed flat on wooden supports, and a run of weld metal deposited simultaneously along each long edge. By careful measurements between pop marks on one of the flat sides, the change in length at various distances from the welded edge or edges was determined, and thus, within limits, the residual stresses were calculated. It was found, however, that up to a distance of about 0·9 in., plastic yield had taken place, but this distance would vary with the details of the weld and the width of the plate. In the first plate, the residual stresses practically disappeared after the removal by a milling cutter of 1·12 in. from the welded edge. For useful practical application, however, the theory and experiments should be extended to cover the more usual cases of two pieces of metal welded together in different ways, but, of course, the analysis is then more complicated.

## Exceptional Rates and Agreed Charges

DURING the recent annual review of railway charges by the Railway Rates Tribunal, some very interesting figures were furnished of the manner in which the railway companies are finding it necessary to exercise their powers to grant rates lower than the standard—or exceptional rates as they are more popularly termed. These powers are exercised by virtue of the Railways Act, 1921, as modified by the Road and Rail Traffic Act, 1933, which authorise the companies to grant exceptional rates provided that those between 5 and 40 per cent. below the appropriate standard charge are reported to the Minister of Transport, and those more than 40 per cent. below the standard are submitted to and obtain the approval of, the Railway Rates Tribunal. The extent to which the companies have granted exceptional rates can be appreciated by the fact that during the eight years ended December 31, 1935, considerably over one million reduced rates were granted in respect of freight train traffic. While the introduction of the new powers to make agreed charges as from January 1, 1934, resulted in a temporary diminution of the number of exceptional rates quoted in that year, the continued competition of other forms of transport rendered it necessary for the companies to grant no fewer than 126,800 such rates during 1935, and this is the highest number for some years.

Further, while during 1934 the largest proportion of the reduced rates was between 5 and 10 per cent. below the standard, the keen nature of the competition experienced during 1935 resulted in the largest percentage of the reduced rates quoted being between 15 and 20 per cent. below the standard, and, in addition, the number of those granted in 1935 between 20 and 25 per cent. below the standard was practically double the number quoted during the previous twelve months. When the individual rates are analysed, it is noticeable that the largest number were in connection with the conveyance of coal, iron and steel, thus indicating that, in addition to endeavouring to meet competition, the companies have not overlooked the desirability of endeavouring to assist the export trade of the country where this could be done without repercussions elsewhere. During the year there was a continuance of the tendency of coal factors and merchants to forward coal from collieries situated in proximity to the coast by steamer to the Metropolis and the South Coast, whence it was distributed to destination by means of a short rail haul or by road transport. Endeavour was made to combat this tendency by reduced throughout rail rates, while to meet road and water competition, large numbers of reduced rates were granted in respect of vegetables, grain and flour and oil cake traffic. So far as passenger train traffic is concerned, 21,300 exceptional rates were quoted, this being a slight reduction compared with the previous year. Generally speaking, the bulk of these rates were introduced for the purpose of fostering local industries and thus developing the conveyance by railway of small quantities of agricultural produce, plants and flowers, laundry, and so forth.

During 1935 the quantity of traffic conveyed under the agreed charge arrangement steadily increased and at December 31 last 200 agreed charges were in operation and a further 116 had been accepted by the traders concerned and were waiting the approval of the tribunal. The companies' estimated gross receipts from traffic charged by this means amounted to about 2·5 per cent. of the total parcels and goods train revenue, or about £2,500,000, thus representing an increase of about £1,000,000 over 1934. The simplification in the charging of traffic under this scheme and the saving in clerical costs is being appreciated by a steadily increasing number of firms, although judging from the substantially larger number of applications in regard to which it has not been possible to reach agreement as to the level of the charge, the hope of securing a reduction in their transport costs is the primary consideration of many firms who seek the introduction of an agreed charge.

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## Freight Traffic Charging, 1930-1935

THE Ministry of Transport returns for 1930 included statistics based upon a detailed analysis of the whole of the freight train traffic, other than coal class, which originated on the systems of the four amalgamated companies, the Cheshire Lines Committee, and the Midland & Great Northern, and Somerset & Dorset Joint Committees during the week ended March 20, 1930. The ministry has now published statistics which were obtained by the railway companies as the result of a similar analysis of freight train traffic during the week ended March 23, 1935, and an examination of the figures affords some very interesting comparisons. They show, for instance, that a materially larger proportion of traffic in Classes 1 to 4 is now being conveyed in privately-owned wagons, the increase being most marked in Class 1, which includes such commodities as ashes and cinders; here the proportion of the tonnage so conveyed has increased from 42·73 to 48·63 per cent. during the five years. Striking evidence is also afforded of the effect which the pressure of road competition is having on the railway rates structure. The figures reveal that, whereas in the 1930 test week 23·47 per cent. of the tonnage of minerals and merchandise conveyed by freight train was carried by the four main line railways at standard rates, and 76·53 per cent. at exceptional rates, during the 1935 test week only 16·13 per cent. of the tonnage was charged at the standard rates, and no less than 83·87 per cent. at exceptional rates, agreed charges or composite rates below the standard. Thus, in five years, there has been an increase of nearly 10 per cent. in the tonnage of freight train traffic, other than coal, at rates less than standard.

So far as receipts are concerned, the proportion of the total revenue derived from traffic carried at standard charges declined from 40·16 per cent. in 1930 to 30·79 per cent. in 1935, while the amount earned from traffic charged at exceptional rates and agreed charges increased correspondingly from 59·84 per cent. of the total revenue in 1930 to 69·21 per cent. in 1935. These figures indicate conclusively that the intention of the Railways Act, 1921, that the scales of standard charges should in large measure replace exceptional rates, has been rendered abortive by road competition. When the figures for the individual companies are studied, it will be found that the increase in the tonnage of traffic charged at rates below the standard during the period in question is greatest in the case of the Great Western Railway, as 85·77 per cent. of that company's originating tonnage was so charged during the 1935 test week, as compared with 76·20 per cent. in 1930, an increase of over 12 per cent. The same tendency, although not so pronounced, can be seen in each of the other group companies, but, while the smallest increase in the proportion of traffic charged at exceptional rates and agreed charges occurred on the Southern Railway, the figures show that in the 1935 test week that company conveyed a higher proportion of traffic at rates below the standard than any of the group companies, *viz.*, 86·97 per cent.; the figures for the L.N.E.R. and L.M.S.R. were 85·99 and 80·95 per cent. respectively.

Another interesting point is that, while compared with the 1930 test week the Great Western Railway figures for 1935 show the largest percentage increase in the ton-

nage charged at exceptional rates and agreed charges, the company's revenue in the 1935 test week showed a smaller decline, compared with 1930, than any of the other groups. It would be unwise, however, to draw any general conclusion from this fact as, while the test figures indicate that the increase between 1930 and 1935 in the proportion of traffic charged at rates lower than the standard was practically the same in the case of the two northern companies, the percentage decline in their revenue differed materially. The returns also reveal that the average receipt per ton from minerals and merchandise traffic, other than coal, charged at standard rates by the four group companies increased from 19s. 9d. a ton in 1930 to 21s. 7d. a ton in 1935, while that from traffic charged at exceptional rates remained unchanged at 9s. a ton. Incidentally, it is interesting to find that, for various reasons, the average receipt per ton from traffic in Class 21 conveyed at standard rates was 60s., while that from traffic charged at rates lower than the standard was 64s. 7d.

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## Argentine Rails . . . . and Politics

THE arrival of the end of the financial year of the British-owned railways in Argentina finds little definite change for the better in their financial position and prospects, although some relief in the matter of exchange has come by virtue of the arrangement made with the Argentine Government for a cheaper rate for remittances, under conditions reported in our columns at the time. The Buenos Ayres and Pacific and Buenos Ayres Western Railways should have more comforting news for their shareholders, especially the former, but the Buenos Ayres Great Southern, the Central Argentine, and, in a less degree, the Entre Rios show heavy losses in gross revenue compared with the previous financial year. Although it is early to refer to the next period, present indications are that the first half, at least, should be more satisfactory, speaking generally, as there is bound to be a larger maize movement. Then remittances at a lower rate of exchange will improve net results, whilst the weather lately has been most favourable for the preparation of the land and the sowing of the new crops.

In regard to the political outlook in Buenos Aires, there is little of encouragement to be reported—rather the contrary. Both Houses of Representatives, the Senate and the Chamber of Deputies, inaugurated their 1936 session in May, in accordance with the Constitution, but it was early obvious that much time would be taken up with political debates and that the "representatives of the people" would take a long time to settle down to real work. During the recess, several new senators had been elected, and half the Chamber of Deputies renewed; and with the results in several provinces being challenged by the opponents of the Government party as grossly unfair and consequently illegal, these issues have to be thrashed out before the Senators and Deputies are ready to discuss business. This being the case, the Co-ordination of Transport Bills and other measures suggested to relieve the situation of the railways are unlikely to get a hearing, unless, of course, the state of the negotiations in regard to the renewal of the Roca-Runciman Agreement stirs the Government parties to instruct their representatives in both Houses to bring these matters forward in order to produce some further evidence of their good will towards the country which consumes most of Argentina's surplus meat. Friction between the Government and the opposition (combined Radicals and Socialists) is greater than it has been at any time since the revolution of 1930, and bitter feeling is rife; so much so that rumours of an impending dictatorship are freely echoed.

## Federated Malay States Railways

CONSIDERABLY more business was done by the Federated Malay States Railways during the year 1935, as disclosed by the report which we have received from Mr. D. H. Elias, the General Manager. Improvement was noticeable in both passenger and goods traffic. An increase of 12 per cent. in passenger numbers gave an increased revenue of 11 per cent. In the case of goods, however, an increase of 8 per cent. in tonnage produced an increased revenue of only 0·3 per cent. The reason for this extreme disproportion between the enhanced tonnage and the relative revenue is to be found in the continued drastic cuts in rates, which are necessary to secure new traffic and retain old traffic, from road competitors. This policy is preventing any general transfer of traffic from the railway, but it will, unless arrested, lead to chaos in the transport system in these States. It is to be hoped that the new Transport Board, the formation of which was foreshadowed in our issue of June 19, will enable the necessary regulation to be made. Total railway revenue improved by $468,547, or 4·96 per cent., and railway expenditure (apart from the contribution of $2,542,409 to renewals) increased by $302,401, or 3·48 per cent., bringing the operating ratio down from 94·38 per cent. to 92·76 per cent., and giving a balance of $906,477 against $740,331. In 1934 the contribution to renewals fund was $2,804,561. Under maintenance of way and works the increase of $126,318 was due to overtaking arrears of maintenance. Rolling stock maintenance increased by $185,842 because of a larger output of repaired rolling stock. Some 600 wagons which were stored in sidings during the trade depression fell into disrepair and had to be dealt with in addition to the usual maintenance programme. Heavier traffic accounted for the advance of $129,232 in the expenses of the transportation department.

The administration also operates railway ferry services at Prai-Penang with three ferry vessels, and at Palekbang-Kota Bharu (Kelantan) with one ferry and two motor launches. Its other activities include road transport services and management of docks, harbours, and wharves. From the combined services there was in 1935 a surplus of revenue over ordinary working expenditure of $1,773,757. In the accompanying table are shown the financial results—at a par value of 2s. 4d. for the Straits Settlements dollar—after including provision for renewals:—

| | 1935 | 1934 |
|---|---|---|
| | $ | $ |
| Passenger train receipts | 4,431,386 | 3,958,677 |
| Goods train receipts | 5,269,786 | 5,256,109 |
| Total railway receipts | 9,905,774 | 9,437,228 |
| Railway expenditure (including renewals contribution) | 11,541,706 | 11,501,457 |
| Loss on railway working | 1,635,932 | 2,064,229 |
| Road transport, ferries, and harbours (net profit) | 236,876 | 222,019 |
| Rentals, interest, &c. (net) | 204,936 | 144,982 |
| Net deficit | 1,194,120 | 1,697,228 |

Among the ancillary services, docks and harbours in 1935 showed a profit of $238,818, and ferries a profit of $1,346, but on road transport there was a loss of $3,288. Collection and delivery services were in operation by arrangement with haulage contractors at 112 stations at the end of 1935, as against 108 at the end of 1934, and additional traffic resulted from the door-to-door transit. Hotels and catering services produced a revenue of $36,217 in 1935, against $27,541 in 1934. During the year the classes of goods were reduced in number from 18 to 15 by eliminating three of the higher rated classes and placing the relative commodities in lower classes. A revised timetable was brought into effect on September 1, 1935, which included speeding-up the weekly express trains on the

East Coast line. A portable electric arc-welding plant for repairing worn points and crossings *in situ* has been in use since October last, and the work performed has been quite up to expectations. Train control on the main line is worked under the selective telephone train control system and extends from Singapore to Prai, a distance of 448 miles. A reorganisation of the accounts department was carried out during the year under review.

# LETTERS TO THE EDITOR

(*The Editor is not responsible for the opinions of correspondents*)

## Shovel Packing

217, Gary Avenue, Wheaton, Illinois,
U.S.A., June 11

To the Editor of The Railway Gazette

Sir,—Your recent articles on shovel packing—or end tamping—of railway ties recall to mind a development of this kind introduced several years ago by the late Mr. Patterson, at a time when mechanical methods of maintenance-of-way work were hardly even in their infancy. His apparatus consisted of a conical hopper mounted on a light frame adapted to run along one rail, and having connected to it a small hand blower. From the small end of the cone extended a flexible pipe with flattened metal nozzle. Another pipe extended from the blower to the nozzle. With the tie raised to proper grade or elevation, finely crushed stone was shovelled into the hopper and blown through the pipe to the flat nozzle inserted under the end of the tie—or sleeper. The machine was used to a limited extent, but the death of Mr. Patterson put a stop to the development, which was a little ahead of its time.

Yours very truly,
E. E. R. TRATMAN

## The Taff Vale and a Predecessor

197, Dawlish Drive,
Goodmayes, June 20

To the Editor of The Railway Gazette

Sir,—I notice with interest the reference on page 1162 of your issue of June 19 to the group of important railways incorporated on June 21, 1836. Of these, only one was for an undertaking in South Wales, but as this one—the Taff Vale—was in effect the link between the old and the new railway eras in the Principality, it is deserving of more than passing notice; moreover, the centenary of its formation provides a suitable opportunity to inquire whether any of your readers can amplify the somewhat meagre particulars available as to the relations between the Taff Vale and the famous Penydarran Tramroad, on which Trevithick used steam rail traction for the first time.

It is, of course, well known that when the interests of the ironworks necessitated some improvement in the primitive means of transport provided by carts and pack mules, some important iron founders secured the incorporation on June 9, 1790, of the Glamorganshire Canal Navigation Company, which constructed a canal between Merthyr and Cardiff and opened it in February, 1794. However, the upper part of this canal appears to have suffered from want of water in summer and to have been frequently frozen over in winter, and Tredgold's "Practical Treatise on Railroads and Carriages" states that in 1794 Homfray, Hill & Company secured an Act (35 George III) for a public iron railway between Merthyr and Cardiff. It seems that the project was abandoned for the time being, but the *House of Commons Journals* for February 18, 1799, records that a group of ironmasters petitioned the House for leave to bring in a Bill for the construction of a "dram road" from Carno Mill (Rhymney) to Cardiff, with branches to Merthyr and Aberdare. This Bill did not reach a second reading, probably owing to opposition from the canal company, but about this time a line was actually built from Dowlais and Merthyr to the canal wharf at Navigation (Abercynon) under the powers of section 57 of the Glamorganshire Canal Company's Act, which permitted the canal company (or, failing it, mineowers and ironfounders with works within four miles of the canal) to build connecting railways. It was upon this line—commonly called the Penydarran Tramroad—that Trevithick ran his famous trips hauling a train with his locomotive; the first was on February 13, 1804. In view of the considerable historical interest attaching to the venture it would be interesting to know whether records have survived of precisely when the line was opened.

When the Taff Vale Railway was promoted for a line built on modern lines from Merthyr to Cardiff, the principal opposition to the Bill came from the Glamorganshire Canal Navigation Company, but the railway promoters seem to have secured the withdrawal of this opposition by paying a lump sum to the canal company. Furthermore, it was stated at the British Association Cardiff meeting in 1920 that during the Parliamentary proceedings the Taff Vale Railway made an arrangement with the proprietors of the Dowlais Penydarran and Plymouth Ironworks to buy the tramway from Merthyr to Abercynon so as to release the three iron companies from a deed of covenant under which they were bound to pay tonnage upon the old tramroad whether they used it or not. The Taff Vale Railway was opened from Cardiff to Navigation on October 8, 1840, and thence to Merthyr on April 28, 1841. On the latter date it would appear that the value of the old tramroad ceased. Is there a record of when it was abandoned?

Yours faithfully,
W. NOEL JACKSON

## Segregation of Traffic

99, Clifton Road, S.E. 25
June 21

To the Editor of The Railway Gazette

Sir,—Doubtless the extended use of close-coupled brake-fitted goods rolling stock might play a valuable part in restoring the lost ascendency of British express passenger services, on which you comment in your issue for June 19. But long and searching investigation has convinced me that, in a country of such high traffic densities, an adequate solution of the problem is to be arrived at only by the crystallisation of existing tracks into high- and low-speed grids, specialising primarily (though not, of course, exclusively) in the carriage of passengers and freight respectively.

That such a segregation of traffic need not prove in any wise disadvantageous even to travellers on the low-speed routes (which would retain an adequate service of local trains and semi-expresses) is clearly shown by the experience of a recent correspondent in these columns who found it possible to save virtually two hours in the morning journey from Carlisle to London by crossing to the other side of England and proceeding by the Silver Jubilee express. Nor, in these days of extended railhead delivery, should there be any difficulty in arranging to send goods from centres on the low-speed system to places on the express routes. In view, however, of the fact that these latter would be available for goods traffic by night, the amount of freight requiring to be transferred by road to or from stations on the low-speed grid would probably be comparatively small.

Such a policy would clear the way for a practical investigation of the possibilities of developing passenger traffic between the big cities by means of faster and more frequent trains. Even if there is no immediate prospect of its adoption, it would seem well worth the companies' while to pave the way by extended use of twenty-ton trucks with a view to easing the prospective strain on the marshalling yards of the low-speed system.

Yours faithfully,
K. H. JOHNSTON

# PUBLICATIONS RECEIVED

**L.N.E.R. Summer Main-Line Timetables.** The London & North Eastern Railway. 11¼ in. × 7½ in. × ¾ in. 458 pp. and folding maps. Price 6d.—The spring issue of the L.N.E.R. main-line timetables was the first to appear reset in Gill sans type. In the summer issue, current from July 6 to September 27, the maps have been redrawn with the same style of lettering, and the L.N.E.R. main lines and branches are now shown in red, instead of black, on a white ground. The maps, of which one is an index to the timetables and the other five cover different areas of the system, have also been enlarged. Instead of being confined to single-page size, they now unfold to 13 in. × 11¼ in., and are consequently much clearer to follow where the ramifications of the system are complicated.

**Trains, Tracks, and Travel** (Fourth Edition). By T. W. Van Metre. London: Simpkin Marshall Limited, Stationers' Hall Court, E.C.4. New York: Simmons-Boardman Publishing Company, 30, Church Street. 9½ in. × 6½ in. × 1¼ in. 296 pp. Fully illustrated. Price 15s. net.—Since the third edition of this book appeared in 1931 a new chapter on streamlined trains has been added, three other chapters have been brought up to date, and 25 new illustrations included. Although addressed to "boys from eight to eighty," the opening chapters strike a slightly more juvenile note than is customary in some British railway books with a similarly comprehensive dedication. Once the reader has accustomed himself to the style, however, he will find this a most digestible popular survey of current railway practice in the United States. The author, who is Professor of Transportation at Columbia University, deals in turn with the various categories of railway equipment, from permanent way and stations to rolling stock and locomotives. Considerable attention is paid to the various types of goods wagons and passenger coaches, many examples of which are illustrated. A good impression is given of the design, interior decoration, and seating arrangements of modern long-distance passenger vehicles in the United States, together with some notes on air-conditioning.

The chapter on stations (passenger and goods) does not confine itself to the more pretentious examples—a representative selection of which is, of course, illustrated—but extends its scope to comment upon some praiseworthy examples of suburban station design. It may come as a surprise to some readers, accustomed to the usually arid country "depots" of the cinema, to learn that "well-kept lawns and flower-beds add much to the appearance of many of our smaller passenger stations." The handling of goods traffic and the recording of goods wagon journeys from system to system (together with their return to the owning companies) are other items of railway procedure to which more attention is paid here than is usual in popular books.

The author's treatment of steam, electric, and internal-combustion engines has been left for consideration last, not because of any shortcomings, but because some less usual features of his book called for prior mention. His survey of railway locomotive development and practice is, within the limits set by the audience he is addressing, admirably copious, and here, as throughout the book, the illustrations do much to compensate those railway students who are unable to make a personal journey to the United States.

**Bath.**—An illustrated folder has recently been issued by the Information Bureau, Bath. The attractions of Bath as a spa and holiday centre are admirably set forth, and a number of excellent illustrations serve to give impressions of the ancient city and its environs. Particular attention is drawn to the excellent services of the G.W.R. and L.M.S.R., and a useful railway map is included showing the various approaches.

**Ventilating Fans.**—Two illustrated folders published by James Keith & Blackman Co. Ltd., 27, Farringdon Avenue, E.C.4, invite inquiries regarding ventilating problems of every kind, which will be answered from the firm's wide experience in this field. The company has numerous provincial branches where similar service is available. Among the well-known products illustrated is the series of Streamline fans, made in all sizes from 9 in. upwards and designed to run at any angle. They are fitted with a.c. or d.c. motors, or with pulleys for belt drive. For large ventilating and heating installations, centrifugal and paddle-wheel fans are made in sizes of as much as 100 in. dia.

**Timken Bearings for Railway Equipment.**—With this as its title, and indexed as publication No. 359, a very interesting and well-illustrated publication has recently been issued by British Timken Limited. The purpose is to illustrate the application of the firm's roller bearings to railway equipment, and to show in a concise form the rapidly widening use which is being made of them in this field. The first railway application of these bearings was made in 1921, since when over 30,000 axleboxes so equipped have been placed in service in all parts of the world. To enable designers and estimators to select Timken equipment for preliminary schemes, a design section is included at the end of the book, and the services of the firm's technical department are placed at the disposal of those intending to include Timken bearings in locomotives and rolling stock, for the design of which they are responsible. The book has 74 pages, and a number of locomotives, railway carriages, and wagons to which Timken bearings have been applied are illustrated. These include the latest streamlined types, locomotives, railcars, and other examples, among them electrical and diesel vehicles. Sectional drawings showing the design of the bearings, and photographic reproductions of details of the bearings themselves and their application, assist to make this publication generally informative, and of value to all designers and users of railway equipment.

**Your Works and Ours.**—Employees of R. A. Lister & Co. Ltd., Dursley, Gloucester, have been presented with an illustrated guide to the firm's present activities, and its progress over seventy years. The welfare schemes instituted for the benefit of employees are also outlined. The historical introduction is followed by a camera tour of the works, designed to introduce readers to the activities of departments other than their own. Not only is the book informative, and calculated to increase the interest of employees in their work, by showing the wide range of Lister products and the many parts of the world in which they are used, but includes safety-first hints and works regulations. From production, the booklet turns to a brief review of the firm's home and overseas distributing organisation, to conclude with illustrations of Lister diesel engines and other machinery in use for purposes ranging from sheep shearing to motor vessel propulsion.

**The Practice of Wood Bending.**—Report No. 10 in the series of sixpenny Forest Products Research Records published by the Department of Scientific and Industrial Research summarises methods of wood bending by hand and machine, and the data obtained from tests of the effect on wood of steaming. A wood-bending machine, illustrated and described, has been designed and built at the laboratory, and although intended primarily for research, is capable of adaptation to commercial requirements. The question of its conversion is now being studied, for it is believed to have features which would enable it to compete successfully with standard machines at present on the market.

**A Forged Piston Alloy.**—Data Sheet No. 35 issued by High Duty Alloys Limited, Slough, gives particulars of the forging alloy, Hiduminium R.R.59, for parts working at elevated temperatures. It is used with particular success for the pistons of aircraft engines, or, indeed in all internal combustion engines subject to the high cylinder temperatures and stresses imposed by modern conditions. It is also suitable for the cylinders and cylinder heads themselves, and is supplied in the form of die stampings, pressings, or hand forgings. Piston forgings in hiduminium possess a very high degree of homogeneity, and great strength and resistance to static and dynamic stresses.

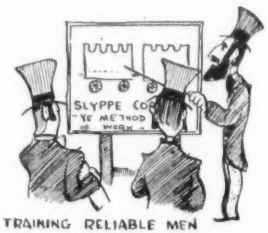
# THE SCRAP HEAP

*This week we abstract on page 1220 the Ministry of Transport report on the slight mishap at Woodford and Hinton on December 19 last involving a slip coach. Accidents in railway slip coach working have been very rare, but we have no information regarding the other forms of slipping shown in these recent cartoons by a versatile artist in the "G.W.R. Magazine"*

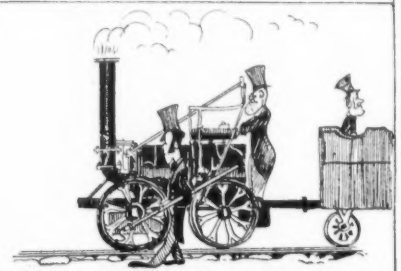
## THE SLIP-COACH

SLIP COACH WORKING ORIGINATED FROM AN ANCIENT CUSTOM

AND WAS DEVELOPED BY STAGE-COACH DRIVERS AT THE APPROACH OF HIGHWAYMEN

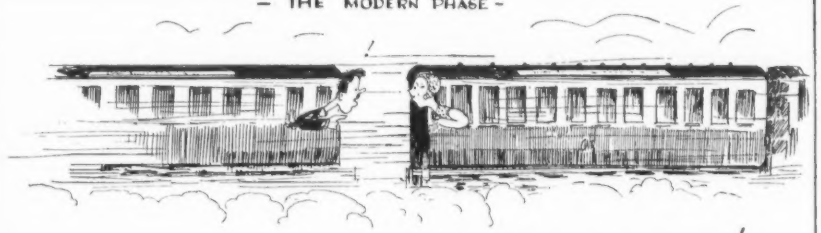



AFTER TRAINING RELIABLE MEN TO ACT AS SLIP-COACH GUARDS, THE RAILWAYS ADOPTED THE IDEA



THE FIRST SLIP COACH GUARD, WALKING BESIDE THE EXPRESS, READY TO 'SLIP' WHEN REQUIRED

— THE MODERN PHASE —

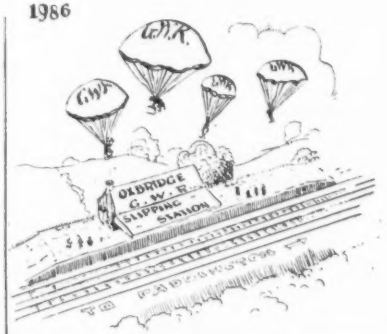


— AND I THOUGHT YOU WERE COMING TO TORQUAY!

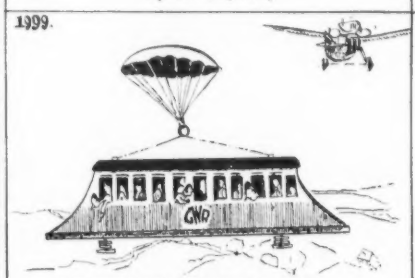
## BUT WHAT OF THE FUTURE?

FORTUNATELY WE ARE ABLE TO INFORM OUR READERS ABOUT THE 'SLIPS' OF THE FUTURE!

1986

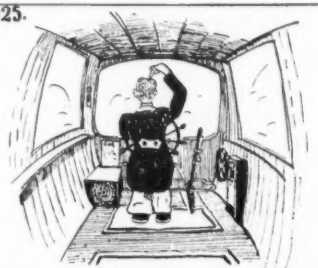



1999.




INTRODUCING THE NEW DE-LUXE SLIP COACHES.

2025.

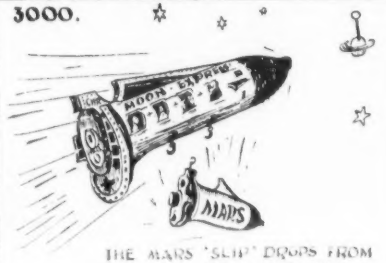


SLIP-COACH GUARD TRYING TO REMEMBER THE NAME OF THE BALKAN STATION HE IS SUPPOSED TO 'SLIP' AT.

2050.

THE PADDINGTON-ORIENT-STRATOSPHERE EXPRESS 'SLIPPING' AT SINGAPORE.

3000.




THE MARS 'SLIP' DROPS FROM THE MOON EXPRESS —

# OVERSEAS RAILWAY AFFAIRS

*(From our special correspondents)*

## ARGENTINA

### Opening of Congress: The Presidential Speech and the Railway Situation

The 1936 session of Congress was opened on May 7 by the President of the Republic (Lt.-Gen. Augustin P. Justo). The Public Works section of his speech was devoted mainly to a review of railway affairs, and stated that the difficult problems arising out of their economic situation were the subject of preferential attention by the Government. Mention was made of the Government commission appointed in 1934 to study and report on the conditions of operation of the national transport services, with special reference to the railways. The conclusions arrived at by the commission, and its recommendations in regard to the alterations in the existing railway laws and regulations, so as to remove or alleviate the disabilities from which the railways were suffering, had been embodied in a Bill which was now before Congress, and which it was hoped would receive early attention. With the approval of the National Railway Board, certain amendments had been introduced into the labour regulations, with the object of utilising the staff to better advantage, in order to obtain a greater output within the legalised working hours (THE RAILWAY GAZETTE of September 13 and 27, and October 18, 1935).

### Higher Net Receipts on Argentine Railways during 1935

The speech went on to say that the Argentine railways, in common with those in nearly every other country, in spite of a slight improvement in their finances, as a result of increased receipts, were still feeling the effects of the world-wide economic depression. Due, however, to the economies effected, working expenses had, as far as possible, been proportionately reduced, with the result that the net receipts for the year 1935 were nearly $10,000,000 paper higher than in 1934.

The Government favoured any measures which would tend to relieve the financial burdens of the private railways, and assist them to earn a just and equitable return on the capital they had invested in Argentina. To this end, the National Railway Board, with the authority of the Government, had approved the application of special tariffs, where these appeared to be justified, to ordinary and season tickets within suburban areas, as well as to excursion tickets, and the rates charged for the transport of grain, cattle and certain classes of general merchandise. Arrangements had also been made for the exchange of wagons between companies with the same gauge, a facility which it was hoped would result in further economies in working.

The speech stated that, owing to the financial situation, the construction of new lines had, as a general rule, been almost suspended during the period under review, only such works as had already been begun, or for which concessions had been granted, and the abandonment of which would have entailed serious loss, had been proceeded with. The State Railways administration had, however, continued with the construction of a number of new branches in regions where additional railway communication was considered indispensable for industrial development, or for the purpose of linking up productive zones with the centres of exportation and consumption. A list of these new extensions was published in THE RAILWAY GAZETTE of March 20 last.

### State Railway Finances

With regard to the financial position of the State Railways, the speech stated that the year 1935 had closed with a net surplus of over $10,000,000 paper. The number of passengers carried showed an increase of 15·23 per cent. as compared with 1934, and the tonnage of goods carried was 11·67 per cent. more than in the previous year. Receipts were 6·70 per cent. higher, while working expenses were only 3·33 per cent. more than those of the previous period. The following table shows the comparative gross receipts of each of the State-owned lines during the years 1933, 1934 and 1935:—

| | 1933 $ Paper | 1934 $ Paper | 1935 $ Paper |
|---|---|---|---|
| Central Northern ... ... ... ... | 44,015,773·18 | 48,639,085·13 | 51,342,703·00 |
| Eastern ... ... ... ... ... | 853,213·82 | 1,195,329·43 | 1,901,788·25 |
| Viedma to Nahuel Huapi ... ... ... | 1,603,948·49 | 2,137,896·42 | 2,269,114·85 |
| Chubut ... ... ... ... ... | 483,143·06 | 421,885·57 | 474,403·48 |
| Comodoro Rivadavia ... ... ... | 392,268·20 | 421,293·21 | 356,008·58 |
| Puerto Deseado ... ... ... ... | 273,239·85 | 277,823·95 | 305,269·66 |
| Total ... ... ... ... ... | 47,621,586·60 | 53,093,313·71 | 56,649,287·82 |

The speech pointed out that the gross surplus on the year's working of the State Railways was, approximately, $11,000,000 paper, due to the fact that the four most important lines had all closed the year 1935 with credit balances, whereas in 1934 and 1933, the Eastern Railway had shown a deficit. Although both the Comodoro Rivadavia and Puerto Deseado Railways again showed deficits on the year's working, these were almost negligible, the combined totals being barely $22,000 paper, so it might be said that the debit balances of all the State Railways had been virtually wiped out. The improved working results had made it possible to refund to the staff a further instalment, amounting to some $4,000,000 paper, representing the salary and wage cuts imposed in previous years.

### Co-ordination of Transport Bills

Although it is over a month since the Argentine Parliament re-assembled, practically nothing has been heard from it in regard to the Bills for Co-ordination of Transport, and at the time of writing, there seems to be little prospect of business discussions superseding politics, due to the serious issues at stake, and the ever-increasing power of the opposition parties.

In the meantime the Association of Omnibus Owners has presented a memorial to the Senate asking for the immediate sanction of the Co-ordination of Transport Bill, owing to the present chaotic conditions of traffic in Buenos Aires. On the other hand the *micro*-omnibus owners and drivers declared a 24-hour strike on June 9 as a further protest against the same Bill. These tactics show how the small buses are driving the large ones out of business.

In regard to the general Bill, the recent convention of *La Fraternidad* (the society of railway enginemen) resolved to withdraw its support of the Bill, due to the modifications, adversely affecting the enginemen, which it had undergone in its passage through the Chamber of Deputies.

The Transport Committee of the Senate, which is studying these Bills, has, however, sent a questionnaire to the transport companies in regard to their views on the matter, which looks as if a policy of marking time has been decided upon.

### B.A. & P. Railway Enterprise

The B.A. and Pacific Railway is the first in the field to meet the constant criticisms of high fares and poor train services, by putting into force, from July 1, enterprising measures, aimed at bringing back to the railway those residents in the Buenos Aires suburbs, who have lately patronised the *colectivo*. Day return fares have been reduced on an average by 35 per cent., but in one or two cases the rebate is over 50 per cent. Season ticket tariffs will be lower, and the timetable will be improved and accelerated, with a 10-minute service to and from Caseros, and trains at 20-minute intervals over the remainder of the suburban area.

### New Suburban Facilities

Arrangements have also been made with the Buenos Aires Terminal Central Railway for an interchange of passengers at, and the sale of

combined tickets *via* a new halt which the Pacific Railway will construct at Calle Triunvirato, where the B.A.T.C. line passes below the former. In this way, passengers from suburban stations on the B.A.P., who change into the underground line at the new halt and Dorrego tube station, can reduce the time taken to reach the centre of the city by some 10 or 12 minutes. In this connection, it must be remembered that the underground line serves the very heart of the city, whereas the terminus of the Pacific Railway is situated at Retiro, which is a 10- to 15-minute 'bus or tram ride from the centre.

# SOUTH AFRICA

### Cheap Travel to the Empire Exhibition

The Rhodesia, South African, and Portuguese East African Railways have announced that overseas visitors to the Empire Exhibition landing at Beira, Lorenço Marques, or any port in the Union of South Africa, will be granted a reduction of 25 per cent. on the fares over those systems. Special excursion facilities are available to parties of four, and various concessions are provided for school children.

### Large-Scale Railway Wagon-building

Orders were issued in April, 1934, for 2,000 E.S.4 steel wagons to be built in the administration's workshops, and the last of these was delivered on March 28, 1936. A steady output from the end of July, 1934, to the end of March, 1936, was maintained at 100 wagons every month of 200 working hours, for these 20 months, or a wagon every two hours on the average.

As the administration's workshops already had on hand orders for 100 coaches and 885 goods vehicles, and as no single one of them could undertake this heavy work, careful planning was necessary in its distribution between the various shops. As a result, it was arranged that assembly and erection should be carried out at Bloemfontein works, and each of the other shops at Durban, Pietermaritzburg, Germiston, Pretoria, Salt River and Uitenhage was detailed to prepare and despatch different parts at regular intervals to Bloemfontein. Materials were supplied in quantities sufficient for 500 wagons at a time, and the work in all shops was scheduled by the clock and co-ordinated. Some 20,000 tons of material were handled in all, and there were 720 parts in each wagon, apart from bolts and rivets.

### Further Large Orders for Railway Workshops

Allocation ensured that no operator or machine had to put in more than two hours' work per wagon, but during that time 1,550 operations had to be completed. The latest methods—eliminating marking off—of dealing with large numbers of plates and parts at a time with jigs, were employed, and electric welding was in some cases used. The success of this work has decided the administration to place a further order for 1,500 similar wagons, in addition to 100 coaches and over 1,000 other new wagons of various types, with its own workshops, which meanwhile are also keeping abreast of normal repair work.

# VICTORIA

### The Financial Position

The revenue received by the Railways Department for the three months of January-March, 1936 compared with those of 1935 was as follows:—

| | 1935 | 1936 |
|---|---|---|
| | £ | £ |
| January ... ... | 834,638 | 909,256 |
| February ... ... | 753,986 | 816,685 |
| March ... ... | 822,646 | 866,705 |
| | 2,411,270 | 2,592,646 |
| Increase ... ... | | 181,376 |
| | | or 7½ per cent. |

The aggregate traffic revenue from July 1, 1935, to January 31, February 29, and March 31, 1936, compared with the previous year was: —

| | |
|---|---|
| July 1, 1934, to January 31, 1935 | £5,586,612 |
| July 1, 1935, to January 31, 1936 | £5,735,548 |
| July 1, 1934, to February 28, 1935 | £6,340,598 |
| July 1, 1935, to February 29, 1936 | £6,552,233 |
| July 1, 1934, to March 31, 1935... | £7,163,244 |
| July 1, 1935, to March 31, 1936... | £7,418,938 |

# NEW ZEALAND

### Government Services Compelled to Use Railways

In a memorandum which is being brought to the notice of civil servants, it is recalled that in May, 1930, an instruction was given to Government Departments and officers that the railway must be used by them "whenever possible," and when it offered "equivalent service at the same price." This instruction has not always been carried out, and the qualifications have apparently been regarded as affording grounds for non-compliance. The matter was therefore reviewed by the Cabinet last month, and a fresh instruction has been issued from the Prime Minister's office, in more explicit terms, to the effect that Government Departments and officers "must use the railway where it is available."

# UNITED STATES

### B. & O. Air-Conditioning

So rapid has been the progress of the air-conditioning equipment of the Baltimore & Ohio Railroad car stock that by June 1 this system and its subsidiary, the Alton Railroad, had 480 air-conditioned cars ready for the holiday season rush. This system claims the first completely air-conditioned car in the world, equipped in 1930, the first completely air-conditioned train (1931) and the first air-conditioned long-distance sleeping car train (1932).

A primitive system of air ducts from an ice box at the front end of a car was, however, in use on the B. & O. RR. as long ago as 1884, the passage of the car through the air forcing a draught of ice-cooled air through the ducts into the passenger accommodation. The present B. & O. air-conditioning is complete, including automatic temperature control, cleaning and humidifying the air mechanically, but without ice.

### Large Pennsylvania Freight Car Building Programme

Last year's Pennsylvania Railroad rolling stock construction programme contained 7,000 new freight cars and 101 electric locomotives. Additionally, however, this year's new programme includes 10,000 freight cars, 6,000 to be built by the railroad at Atoona, Enola, and Pitcairn shops, and 4,000 by outside firms. Of the former, 1,500 have already been completed, and 4,500 are in hand; while over 3,000 out of the 4,000 have already been delivered by the car-building firms. Among the various types included in this extensive programme are 3,000 cars for the carriage of road motor vehicles, 4,700 steel box cars, and 300 special covered hopper cars for the carriage in bulk of cement, lime and other commodities requiring protection from the weather.

### High-speed Mallet Locomotives

The Norfolk & Western administration has recently completed in its own shops at Roanoke, Va., a Mallet type (2-6-6-4) locomotive, with 5 ft. 10 in. coupled wheels and designed to pull freight trains at maximum speeds as high as 65 and 70 m.p.h.: a second identical locomotive is under construction. This new type has a tractive force of 104,500 lb., weighs in working order nearly 1,000,000 lb. (446 tons) and is 120 ft. long overall. The boiler is nearly 61 ft. long, weighs 148,500 lb., holds 9,835 U.S. gallons of water and has a working steam pressure of 275 lb. per sq. in. The firebox has 122½ sq. ft. of grate area. The tender has a capacity of 26 short tons of coal and 22,000 U.S. gallons of water.

### Reduced Fares in Effect

As from June 1, the Eastern railways under order of the Interstate Commerce Commission, abandoned the 1·8d. a mile standard passenger fare, and inaugurated the new basis of 1d. a mile in coaches and 1½d. in Pullman cars. The Eastern railways, excepting the Baltimore & Ohio, are fighting the commission's order in the courts, but meantime they are advertising the reduced rates extensively and appear to be determined to make the new rates succeed if they possibly can.

The controversy between the railways and the commission gave the reduced rates widespread free publicity in the press, but all the bus lines

also have reduced their fares (in some cases to as low a figure as ⅝d. a mile), but the differential of ⅜d. between this rate and the railroad rate is much less than the ¾d. to 1d. differential which obtained before; theoretically at least, therefore, the railways' competitive position is greatly strengthened. But the great appeal for increased passenger traffic must be to persons who heretofore have driven their own automobiles. The rate of 1d. a mile is much lower than the out-of-pocket cost of driving an automobile with one person in it, and is not appreciably greater than for two persons.

# TURKEY

### The Oriental Railways Company

In reply to a question about the negotiations for repurchase of the Betriebsgesellschaft der Orienbahnen (The Oriental Railways Company) the Minister of Public Works stated recently in the National Assembly at Ankara that the repurchase of the line itself did not come into the matter, since the stations and track had always belonged to Turkey. He then mentioned that in his Government's view, the treaty of 1929 bound the company to make certain payments, but it had hitherto not made them. Negotiations were taking place which, he hoped, would end in the transfer of the undertaking to the Government.

### Existing System

As early as September, 1855, the Ottoman Government announced its intention of encouraging the construction of a railway joining Constantinople (now Istanbul) with the European lines. After a long delay a concession was granted in 1869, and the Oriental Railways Company was formed. The line from Constantinople to Adrianople was opened in 1872 and joined to the line running through Belgrade on August 12, 1888. Many other lines were constructed, but the Balkan wars of 1912-13 and the European war, 1914-18, resulted in various sections passing into the hands of the States which took over portions of Turkey in Europe, and at present the only main line left is that from the Turkish frontier to Instanbul, which forms part of the main line to the East, and is used by the Orient expresses. This company has a close working arrangement with the Franco-Hellenic Railway. As shown on the accompanying sketch map, the Oriental Railways system comprises isolated sections totalling 338 km. (210 miles), namely 281 km. (175 miles) from Istanbul to Maritza; 8 km. (5 miles) from frontier to frontier *via* Adrianople; the 3-km. branch to Adrianople Town; and a branch 46 km. (28½ miles) long from Mandra to Kirklareli.

### Turkish Railway Results

According to figures quoted by the Minister of Public Works, gross takings of the Turkish State Railways in recent years were as follow: £T.20,700,000 in 1930-31; £T.21,200,000 in 1931-32; £T.17,000,000 in 1932-33; £T.19,500,000 in 1933-34; £T.23,700,000 in 1934-35; and £T.21,500,000 in 1935-36.

# SWEDEN

### Railway Labour Peace Ensured for 18 Months

A new labour agreement has been concluded between the State Railways and their engineering maintenance and construction employees, embodying certain modifications of the general conditions of service and an increase in hourly wages of 3 ore; it will remain in force until the end of 1937, and affects 5,000 men. The other sections of the State Railway staff are considered as Government officials and are subject to the regulations for these. The signing of this document, states a Reuter's message, completes the series of agreements ensuring labour peace for one-and-a-half years on all the Swedish railways, as others, which will remain in force until the end of 1938 were recently signed between the private railway companies and their workers, numbering some 18,000.

*The Oriental Railways system, which now comprises only the lines in European Turkey*

# CHILE

### Increased Coal Production

According to *The South Pacific Mail*, the national coal production of Chile during the year 1935 amounted to 1,900,000 tons, as compared with 1,807,000 tons in 1934, and 1,540,000 tons in 1933. It is believed that the total output for the present year will be still higher. About 58 per cent. of the coal has been produced by the *Compañia Minera e Industrial de Lota*, and the remaining 42 per cent. by the Schwager Company. It is reported that, owing to the higher wages paid to the miners and the increased cost of imported machinery and other materials used in the industry, the price of Chilean coal is to be raised 20 per cent.

# JAPAN

### Level Crossing Accident Case

After proceedings spread over eight years, the Court of Appeal in Tokyo upheld the Osaka Court's award of Yen 800 (£46) damages to the mother of a taxicab driver killed on an unguarded level crossing, on a Government Railways main line. The crossing has no barriers, but clearly visible "Beware of the Trains" signs. The Court held that these signs were not sufficient to exonerate the Railway Ministry from responsibility in the case of accidents, and considered that more effective measures should be designed to prevent accidents.

# MANCHUKUO

### Payments for Chinese Eastern Railway

The placing by the Russian Government of orders under the Chinese Eastern Railway Purchase Agreement, has now practically ended. On May 1, a balance of Yen 1,111,000 (£65,000) was outstanding of the Yen 93,300,000 (£5,450,000) total of the agreement. The list of goods ordered up to November 30, 1935, was published on page 50 of THE RAILWAY GAZETTE for January 10, 1936. During the half-year December, 1935—May, 1936, orders for the following goods were placed in Japan and Manchukuo.

| | Y. | £ |
|---|---|---|
| Machinery ... ... | 4,438,000 | (259,000) |
| Ships ... ... | 6,327,000 | (369,000) |
| Tea ... ... ... | 5,607,000 | (327,000) |
| Copper cables ... | 986,000 | (57,000) |
| Other materials ... | 1,773,000 | (103,000) |
| Total value of orders | 19,131,000 | (1,115,000) |
| Value of former orders ... ... | 73,058,000 | (4,260,000) |
| Total value, May 31 | 92,189,000 | (5,375,000) |

# THE BULGARIAN STATE RAILWAYS

*By S. H. BEAVER, M.A.*

MODERN Bulgaria comprises 39,824 sq. miles of territory with a population of about 6,000,000. The kingdom is bounded on the north by Roumania, on the west by Jugoslavia, on the south by Greece and Turkey, and on the east by the Black Sea. In common with other Balkan States its frontiers have been changed on a number of occasions within the last 70 years—since the first railway was opened—and in consequence the development of the railway system was governed by other considerations than that of serving the present territory. In fact, the history of the Bulgarian State Railways is roughly divisible into seven periods.

## The Ottoman Empire Period to 1876

At the beginning of the nineteenth century the Ottoman Empire in Europe included practically the whole of the Balkan peninsula. Russia had secured control of the northern shores of the Black Sea, and in 1812 annexed Bessarabia. Then the subject nationalities in European Turkey one by one began to revolt, beginning with Servia, which became a principality in 1817 and a kingdom in 1882. The Ottoman Government published a manifesto in September, 1855, announcing its intention of encouraging the construction of a line from Belgrade to Constantinople (now Istanbul) but the project lapsed. This appears, however, to have been the first proposal to build a railway through what is now Bulgarian territory. Then in 1857 a scheme was propounded for a line from Constantinople to Rouschouk (Russe) on the Danube, which also came to nothing.

The first real stimulus to railway development in the Balkan Peninsula was the need for better communication between west and east—or, translated into more local terms, between the lower Danube and the Black Sea; for the navigation of the last 150 miles of the Danube, including its delta, was difficult. For this purpose two railways were built with British capital. The first was the undertaking of the Danube & Black Sea Railway and Kustendje Harbour Company, which was concessioned by the Ottoman Government and opened its 40 miles of railway—from Chernavoda on the Danube to the Black Sea port of Kustendje (now Constanza)—on October 4, 1860. The moving spirit of this enterprise was John Trevor Barkley.

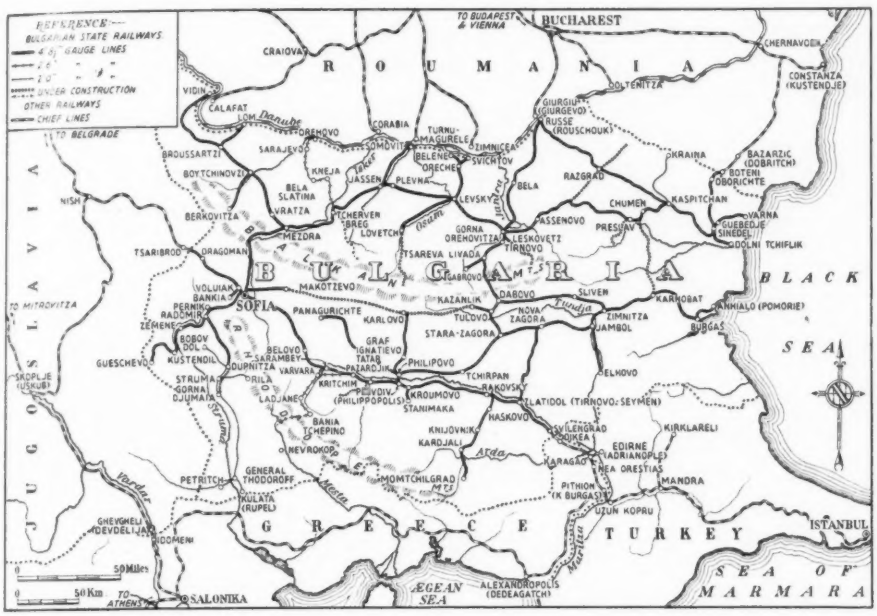
Then, in 1863, Turkey granted a concession to the Varna Railway Company, also of British origin, for a railway 138·6 miles long from Rouschouk (Russe) on the Danube to Varna on the Black Sea; this was opened in October, 1866. This was the first railway in the territory which now comes within the Bulgarian kingdom. It was a poorly-constructed line, and for some time was on the verge of bankruptcy owing to poor financial backing and lack of traffic. The lack of traffic was due very largely to the existence of the Chernavoda-Kustendje line and to the inadequacy of the port of Varna. Also, a scheme for building an international line from Western Europe via Rouschouk and Varna, upon which the local line had doubtless built hopes of securing a heavy through traffic, was not carried out. On the other side of the Danube from Rouschouk, however, was Giurgevo, and the United Roumanian Principalities of Wallachia and Moldavia (to become the kingdom of Roumania in 1881) arranged for John Trevor Barkley to build a railway from Giurgevo to Bucharest, which was opened on October 19, 1869.

In 1865, a Minister was appointed by the Turkish Sultan to go into the question of a main line of railway to link the Turkish capital, Constantinople, with the Austro-Hungarian frontier, via Sofia, with various branches. The outcome of this was that in April, 1869, a concession was granted to a German financier, Baron Hirsch, and work was begun. By 1873 the line had advanced from Constantinople to Belovo, in the upper part of the Maritza plain. Two branches had been constructed from this trunk line by 1874, one from Adrianople to the Ægean Sea port of Dedeagatch, and the other from Tirnovo-Seymen (Zlatidol), on the River Maritza, up the easy routeway of the Tundja river to the wheat-growing centre of Jambol. In addition, the railway had been advanced up the Vardar river valley (from time immemorial one of the main avenues of communication in the Balkan Peninsula) from Salonika via Uskub to Mitrovitza. Baron Hirsch's original company was the Cie Gen. pour l'exploitation des chemins de fer de la Turquie d'Europe, but the enterprise is better known by the name it assumed after the Russo-Turkish war of 1878, namely, the Oriental Railways Company.

## Wars and Discussions, 1876-1888

Railway building was at a standstill for the next dozen years, owing to the great political upheaval which began in 1876. The years 1876-8 saw the liberation of Bulgaria from the Turk, and the establishment by the Treaty of Berlin (July 13, 1878) of the country as an independent Principality. The complete reorganisation of frontiers in the eastern part of the Balkan peninsula, resulted in an important part of the Oriental line falling within the new principality of Eastern Roumelia (although it continued to be worked by the owning company). Then in 1881 a Four-Power Conference (consisting of Austria-Hungary, Serbia, Bulgaria, and Turkey) was held at Vienna, to make provision for the completion of the international east-west line. It was agreed that the section of the line through Bulgarian territory should follow the route Belovo-Sofia-Tsaribrod (-Nish), much against the wishes of the Bulgarians, who for several reasons would have preferred it to run Sofia-Kustendil-Uskub. The latter line had already been surveyed by a Turkish company as part of a great trunk line to connect Uskub with the river Danube. Bulgarian cultural and economic influences in Macedonia were considerable, and such a railway would greatly have helped in the further alienation of this valuable region from the Turk; morever, it would have passed through a coalfield and several rich agricultural basins. In 1884 the Bulgarian government declared for a State railway policy, and the prohibition of private railway building—a policy which has been adhered to, except in the case of certain very small industrial lines, ever since. But very little State money was available for railway building, and minor frontier wars with Serbia, and the revolution in Eastern Roumelia, which transferred that province from Turkey to Bulgaria in 1885, all contrived to delay the completion of the international line. Only in 1888, two years after the agreed date of completion, was through rail communication possible from Central Europe (and the English Channel) to the Golden

Horn. This was a period of valuable discussion in the Government as to the most important routes to be followed by railways. One of the earliest lines agreed upon was that from Jambol, through one of the richest cereal growing areas in the country, to the Black Sea port of Burgas, a line completed in 1890. And in 1888 the Bulgarian Parliament purchased the Rouschouk-Varna Railway and embarked upon a most ambitious programme of building, voting no less than 105 million levas for lines which included a trunk line from the Turkish frontier in the south-west via Sofia and the northern part of Bulgaria to the port of Varna, and also a trans-Balkan connection between this line and the main international line. Nothing seems to have come of this programme, however, though all the lines which it outlined were subsequently built.




*Sketch map of the railway system of Bulgaria*

### Expansion with Borrowed Money, 1888-1900

Domestic finances proving unequal to the task of supporting the construction of so much mileage, a large loan (142 million levas) was raised abroad, and the great works begun. The main purpose was to link the already existing lines, namely, the international line, the Jambol-Burgas, and the Rouschouk-Varna. The long east-west line across the northern part of the country was begun at both ends, Sofia and Varna, and since the import of the materials for construction was a matter of great difficulty in the central portion of this region a special line from the Danube port of Somovit southwards to Jassen was built, so that rails, &c., might more easily be obtained by water from Germany and Austria. The whole line was completed by 1897, and proved a most valuable means of transport, especially for cereals (for export via Varna and for home consumption in Sofia), in an area whose dominant physical lines of communication are the south-north river valleys. A short branch line near the eastern end was built to serve the milling centre of Devnia. At the western end the construction of the Sofia-Kustendil line was advanced, and in 1893 the one and only important coalfield (or rather, lignite field) in the whole of Bulgaria, at Pernik, was reached, enabling fuel supplies for the railways and for the population of Sofia to be readily obtained. Another link line begun during the same period was the so-called " parallel line " from Plovdiv (or Philippopolis) to Nova Zagora, across the northern part of the great Maritza plain. This line was intended to act as a short cut from western Bulgaria to the port of Burgas, so as to attract traffic which might otherwise have reached the sea via the Oriental Railway Company's line to Dedeagatch. Finally, the northern line was linked to Rouschouk by a line, completed in 1900, leaving that line at the important market town of Gorna Orehovitza. This line was also continued southward for a few miles to Jirnovo, a former capital city of the country.

### Financial Stress, 1900-1906

The amount spent on these works, and the interest on loans already obtained, rendered the financial position very serious, and it was necessary to raise a further loan of 260 million French francs. All the Government could do was to suspend activities for a while; and in its extremity it also let the finished portion of the " parallel line " to the Oriental Railways Company, which undertook to complete the line. The conclusion of the curious history of the Maritza valley line may be referred to here. In 1908 Bulgaria finally severed its last connection with the Turkish rule and was proclaimed a kingdom; a tariff union was therefore agreed upon between the Bulgarian railways and the Oriental Railways Company, and towards the end of that year the Bulgarian State bought up, for much more than they were worth, the lines of the Oriental Railways (Vakarel-Sarambey and Zlatidol-Jambol). The " parallel line " was then completed in 1910.

### Period of Expansion, 1906-1912

With the passage of time the financial situation improved, and the most pressing need was now for a trans-Balkan connection. Several proposals were made as to the exact location of this line, and it is interesting to observe the motives behind each. There seems to have been no disagreement as to the northern starting point. The important route centre and manufacturing town of Gorna Orehovitza on the Sofia-Varna line, was a natural point, especially in view of its connection with the Danube at Rouschouk (Russe). The first suggestion was for a line via Gabrovo, the chief textile manufacturing centre in the country, the Shipka (" Wild Rose ") pass, and Kazanlik, the centre of the famous Tundja valley rose-growing industry to Stara Zagora, an important agricultural (including wine-producing) centre on the " parallel line." This was clearly the most obvious line from the geographical point of view. The others were (*a*) via the Hanikoi pass to Nova Zagora (a rather easier route than the last, but not passing through such economically important areas), and (*b*) via the Elena basin (a rich agricultural region) to Sliven, the second textile centre of the country, on the Jambol-Burgas line. Actually, none of these routes was adopted, the decision falling ultimately

upon the most direct route possible, via the small coalfield of Platchkovtzi and a pass just a little east of the Shipka, down to Stara Zagora, with branches subsequently constructed to Gabrovo and Kazanlik. The line was begun in 1905, and the very difficult nature of the topography rendered the work extremely slow. Nearly eight years were occupied in building 139 kilometres, and the line includes a spiral ascent to the summit (about 3,300 ft.) on the northern side, and a figure-of-eight, mainly in tunnels, down the much steeper southern side of the Balkan Mountains.

The other line for which need was felt at this period was that extending south-westwards from Sofia towards Macedonia. The ultimate objectives were Uskub (Skoplje) and Salonika, for the reasons given above. The agricultural basin of Kustendil was reached in 1909, and the Turkish frontier at Gueschevo in the following year. There was, however, no corresponding activity on the Turkish side and to this day the connection remains incomplete. However, the line as built gave an outlet to the Black Sea for the products of south-western Bulgaria. During this period also a railway line down the Struma valley (leading to Salonika or Kavala), was visualised, and earthworks were actually begun at Radomir in 1910, but little real progress was made before the long series of wars. The period also witnessed the improvement of communications in the northern part of the country, linking the cereal producing areas along the Sofia-Varna line with another avenue of export trade, the river Danube. The Levski-Svichtov line was completed in 1909, and the Mezdra-Vidin line was begun in the same year, though in this case progress was slower and the wars delayed its completion.

### Wars and Changed Frontiers, 1912-1918

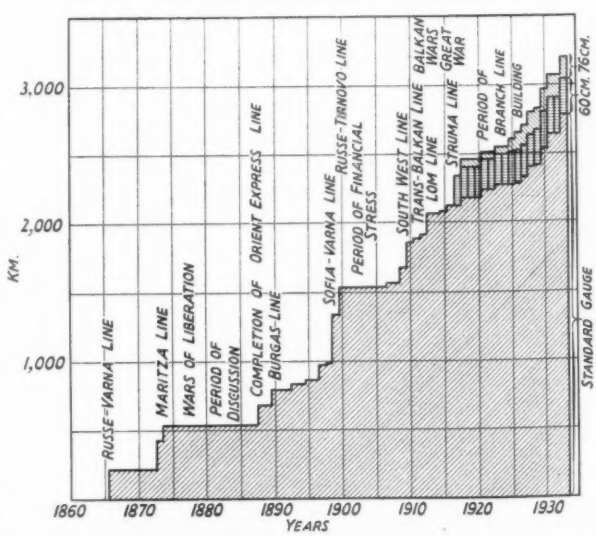
In the first Balkan War, 1912-13, the Balkan allies defeated Turkey, and for a few brief weeks Bulgaria was greatly enlarged, including much of Macedonia and a large area south-east of its previous frontier. Quarrels between the allies over the division of the spoils, however, precipitated the second Balkan War of 1913, which resulted in the complete humiliation of Bulgaria. We may summarise the net gains and losses of territory by Bulgaria in so far as they affect the railways. Bulgaria *gained* (1) a large area in the south-west, comprising the Struma and Mesta valleys (a valuable agricultural, especially tobacco-producing, region; (2) a large territory stretching across the Rhodopes to the Ægean Sea, including the port of Dedeagatch. This was a mixed blessing, however, for, as the map shows, direct connection through Bulgarian territory from the Maritza valley line to Dedeagatch was not possible without traversing Turkish lines in the region of Adrianople. Then Bulgaria *lost* a most valuable piece of territory—a great granary—in the Dobrudja, which was ceded to Roumania. This had an important effect on the ports of Kustendje (Constanza) and Varna, adding to the hinterland of the former whilst subtracting a large part of the hinterland of the latter, with corresponding effect on traffic. Noteworthy, too, is the stultifying of the Dobrudja line of railway, completed as far as Oborichte (now the frontier) in 1910, and actually completed in 1915 on the Roumanian side. What might have been an important through line for wheat traffic now has little or no through traffic at all, but is divided, as it were, at the frontier, the small Bulgarian section being tributary to Varna and the larger Roumanian section to Constanza.

Quickly following upon the defeat of 1913 came the disaster of the great war. Bulgaria cast her lot with Germany, and although there was little actual fighting within the country except on the south-western frontier zone, the drain on the country's resources, after the deadening blow of 1913, was well-nigh insupportable. Railway development was almost at a standstill. In the south-west, however, a 60 cm. gauge line—the first narrow-gauge line in the country—was built by the military authorities with German material and equipment. This line followed the Struma valley from the main south-western line of the Bulgarian State Railways at Radomir to Demirhissar, on the Salonika-Constantinople line. Two other narrow-gauge lines also made their appearance. The first, on the 60 cm. gauge, ran from Kaspitchan, on the Rouschouk-Varna line, to the Roumanian frontier at Kraina, and was designed to assist the military operations on the frontier, and also to provide cereals and wood-fuel from the timbered agricultural region of the Deli Orman forest. The second, on the 76 cm. gauge (the gauge which had proved so successful in the development of the narrow-gauge system of Bosnia, Herzegovina, and Serbia), was built from Tcherven Breg, on the Sofia-Varna line, to the Danubian port of Orehovo. At the end of the war (1919) these lines were opened to the public, and they have since proved very useful for certain classes of traffic in the areas which they serve. Thus the Struma valley line serves two small coalfields (Oreshetz and Bobov Dol), the Kaspitchan line carries wood fuel, and the Orehovo line cereals. It should be noted that, when the Bulgarian army retreated, it removed the rails from the southern section of the Struma valley line, and as a political frontier now runs across this region they have never been replaced.

### Post-War Conditions—Depression and Expansion

The Treaty of Neuilly outlined the new boundaries of Bulgaria. The most vital loss of territory was the section of the Ægean coast, including the port of Dedeagatch—a loss which restricts Bulgarian seaborne trade to the Black Sea ports and the Dardanelles exit to the Mediterranean. Actually, under the Treaty, Bulgaria was to have been allowed freedom of access to Dedeagatch, but this part of the Treaty has never been ratified, and no such facilities exist. On her western borders Bulgaria lost three valuable areas, one in the south-west, one in the north-west, and one in the centre. This last has the Orient Express route running through it, and 10·5 km. of formerly Bulgarian line had to be ceded to Jugoslavia (though trains over this section are still worked by Bulgarian locomotives).

The loss of territory was not the most serious disability




*Growth of the Bulgarian State Railway system*

from which the country suffered, however, in the post-war years. Loss of man power, financial ruin due to the costs of the war and reparations payments, and the effects of the worldwide economic depression would have crushed a people less virile and patriotic than the Bulgarians. Despite the depression, the difficulty of securing credit and of paying for imports, and the difficulty of disposing of agricultural produce, much progress has been made towards building up a new country, and the last fifteen years have witnessed the opening of a number of new and important lines of railway.

There is the project for a sub-Balkan line, running south of, and parallel to, the Balkan Mountains, from Sofia, via the rich agricultural basins of Pirdop, Karlovo, and Kazanlik, to Sliven (and so to Burgas), with branches linking this line to the Maritza valley Orient Express line. Several sections of this plan have been accomplished, and work continues. Secondly, a very useful piece of construction—albeit a difficult one, with a tunnel 1,121 metres in length—is the line serving the Arda basin, a rather backward, yet quite rich, agricultural region, producing tobacco and silk. This line runs from Kardjali, on the Orient line, to Momtchilgrad, and a connection across the Greek frontier to Dedeagatch is visualised, though at the moment this is rather improbable. A third group of lines comprises three trans-Balkan routes two of which have been begun at their northern ends. One is intended to continue the Levski-Lovetch line southwards through the agricultural basin of Troian and over the mountains to Karlovo, on the projected "sub-Balkan" line; a second will continue the Gorna Orehovitza-Leskovetz line through the Elena basin; and a third will follow a comparatively easy route across the lower and wider eastern end of the Balkan Mountains from Chumen to Karnobat. This line, if built, might have important effects on the cereal traffic tributary to Varna and Burgas respectively. Fourthly, in the south-western region two projects are on foot. The Struma valley line is being converted from 60 cm. to standard gauge, and the Tchepino 76 cm. line, constructed in 1926-8, and serving the valuable forests of part of the Rhodope Mountains and the important hot-spring tourist centres of Ladjane and Bania Tchepino, is possibly to be extended over a most difficult piece of country to the Mesta valley, where its ultimate object will be the town of Nevrokop. Thus in both the Struma and Mesta valleys the natural southward flow of traffic to the Ægean ports will have been converted by the interposition of a political frontier into a northward movement towards the Sofia or Maritza basins. A fifth line of recent construction (1931) is that from Jambol to Elhovo, passing through a rich wheat-growing region. It is interesting to recall that this route was originally suggested by the Turks as far back as 1865; and the present line replaces a horse tramway. Then, in the region of the capital, Sofia, several developments have taken place. In the first place a girdle or *ceinture* line has been constructed, mainly to serve the factories which have grown up on the outskirts of the city, and secondly a line has been built westwards to the hot-spring, mineral bath centre of Bankia, which has thus been transformed into a kind of week-end resort for the wealthier Sofia residents. Lastly, a small length of railway in the Maritza plain is visualised, which might have very great effect upon north-south communication in the Balkan Peninsula. This is the link, from Rakovsky to Mihailovo, between the Orient line and the Trans-Balkan line. It would give direct communication between Istanbul (Constantinople) and Rouschouk on the Danube, and if the projected train ferry across the river from Rouschouk to Giurgevo (Giurgiu) materialised, it would create an entirely new route from Istanbul to Bucharest to replace the present all-rail journey via Belgrade or the alternative by sea to the Danube mouth and then rail. If, too, the Momtchilgrad-Dedeagatch connection were made, through traffic would then be possible from Bucharest to Dedeagatch, giving Roumania a quick route to the Ægean Sea.

## THE KNORR FEED-WATER HEATER

### *A 10 per cent. economy is claimed for this exhaust steam heater*

THE accompanying illustrations show the principal features of the latest type feed-water heater designed and constructed by the Knorr Bremse Aktiengesellschaft, comprising a high-speed compound feed pump working in conjunction with a surface-type heat-exchanger. By utilising the main and feed-pump exhaust steam to preheat the feed water to 100° C. (212° F.), about 10 per cent. heat recovery is effected, with a corresponding saving of coal or greater effective output.

A compound direct-acting pump draws water from the tender and forces it through the tubes of a heat-exchanger, which acts as a surface condenser to exhaust steam from the locomotive engine and feed pump. As will be seen from Fig. 1, the feed pump is situated between the tender

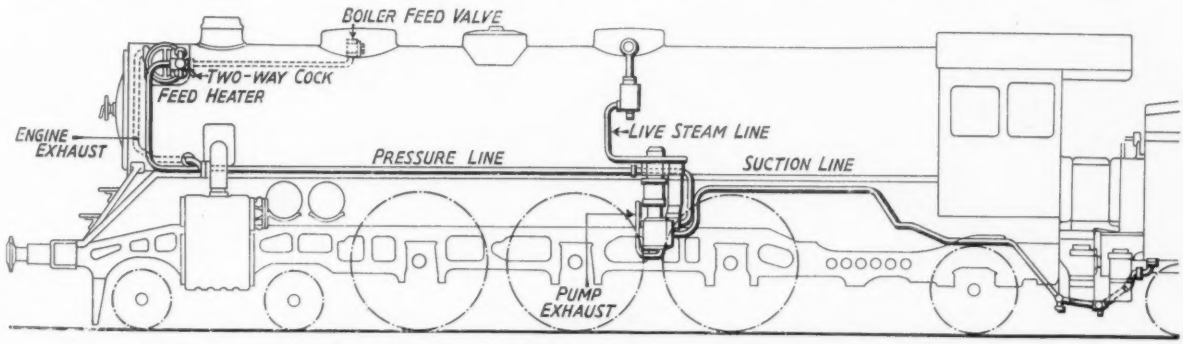



*Fig. 1—General arrangement of feed pump and exhaust steam feed-water heater by the Knorr Bremse A.G.*

and the feed-heater. It draws cold water from the tender and its suction is maintained even with low water level and a high outside temperature. Live steam for the pump is taken from the boiler and the exhaust is passed to the feed-water heater. As shown by the inset drawing in Fig. 2, a steam stop valve is provided for regulating the pump delivery between zero and a maximum as required, and the oscillating pointer of a pressure gauge indicates the number of strokes.

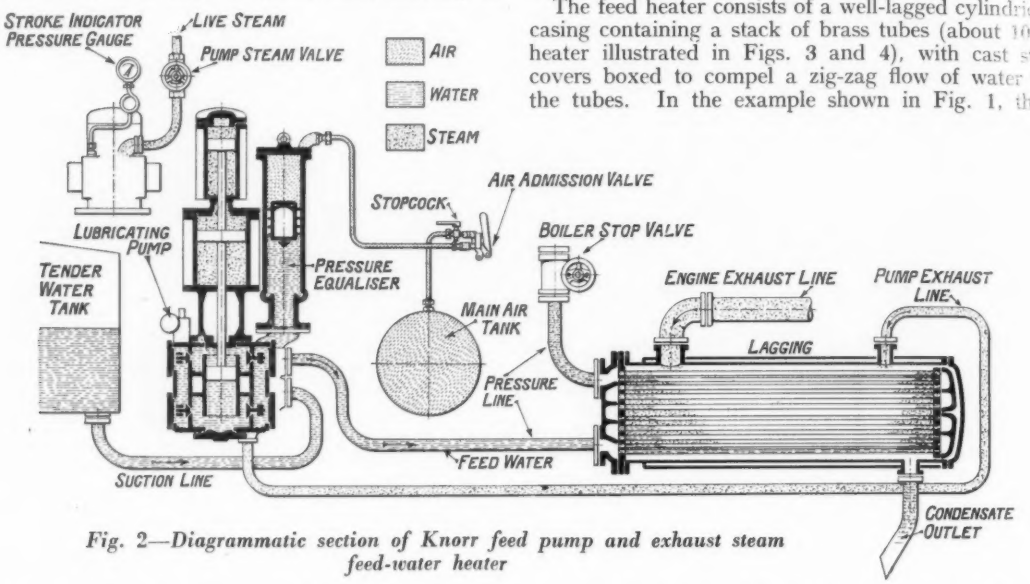



*Fig. 2—Diagrammatic section of Knorr feed pump and exhaust steam feed-water heater*

The pump, which is of the high-speed type without flywheel, works independently of the regulator setting, cold-feed temperature, boiler and exhaust steam pressures. Its satisfactory performance in service is largely due to the use of Tolkien piston valves controlled directly by the high-pressure steam piston. The main and auxiliary valves lie on the same axis, are effectively damped, and can easily be dismantled. The individual valves in the water cylinder are also easily accessible. All working parts under steam are lubricated by an adjustable oil pump, and smooth action is ensured by a suction air receiver on the intake and a compressed air equaliser on the delivery. A float in the delivery equaliser prevents air absorption, and the air pressure above the float is maintained by admissions from the compressed air tank.

The feed heater consists of a well-lagged cylindrical plate casing containing a stack of brass tubes (about 100 in the heater illustrated in Figs. 3 and 4), with cast steel end covers boxed to compel a zig-zag flow of water through the tubes. In the example shown in Fig. 1, the water traverses the length of the heater eight times before leaving for the boiler. The tube plate at one end is bolted between the casing flange and a single-piece end cover with inlet and outlet seatings. At the other end, the tube plate is in two parts, free to slide inside the casing, thus ensuring unconstrained expansion and contraction. The tube-plate cover at this end is also divided and secured by studs with covered nuts (Fig. 4). Water enters at the bottom and leaves at the top at about 100° C. (212° F.). Its high velocity of flow through the tubes promotes turbulence, resulting in rapid heat transference and freedom from scale deposits. The heater is generally mounted across the top of the smokebox, facilitating condensate return, but it is often attached to the running plate.

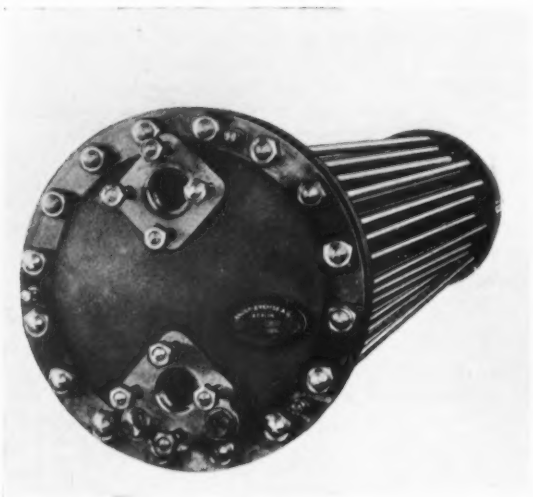


*Fig. 3—Knorr exhaust-steam feed-water heater withdrawn from its casing, showing end cover with inlet and outlet seatings*

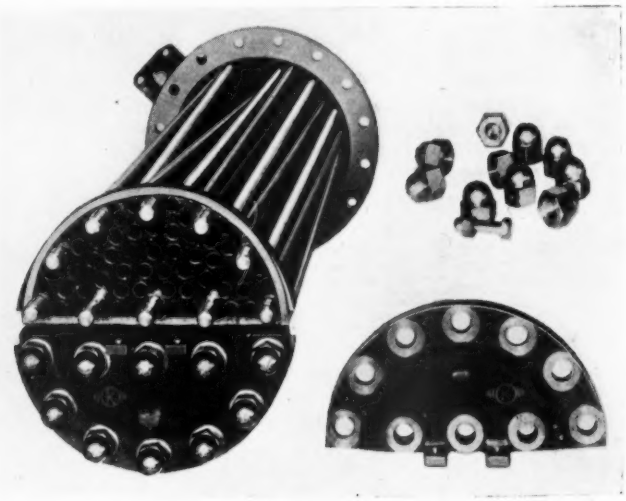
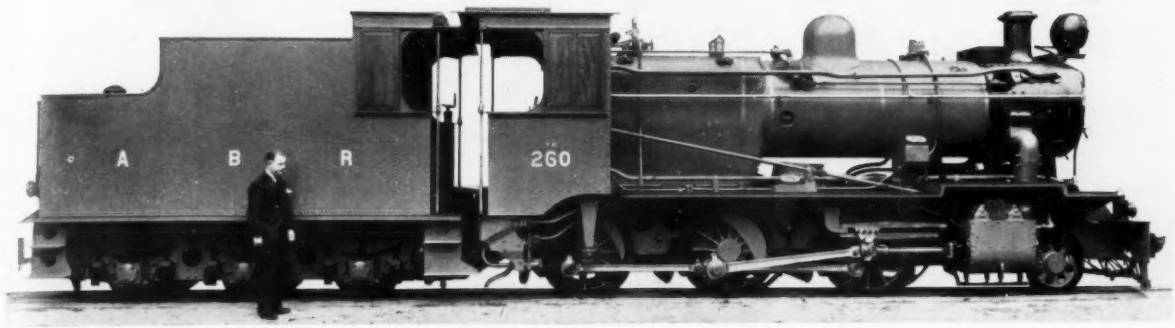


*Fig. 4—Showing divided tube plate and end covers of Knorr feed-water heater, providing for free expansion and contraction*

# NEW 2-6-0 STANDARD LOCOMOTIVES, ASSAM-BENGAL RAILWAY

***These metre gauge engines which belong to the class YK will be used on branch line service***

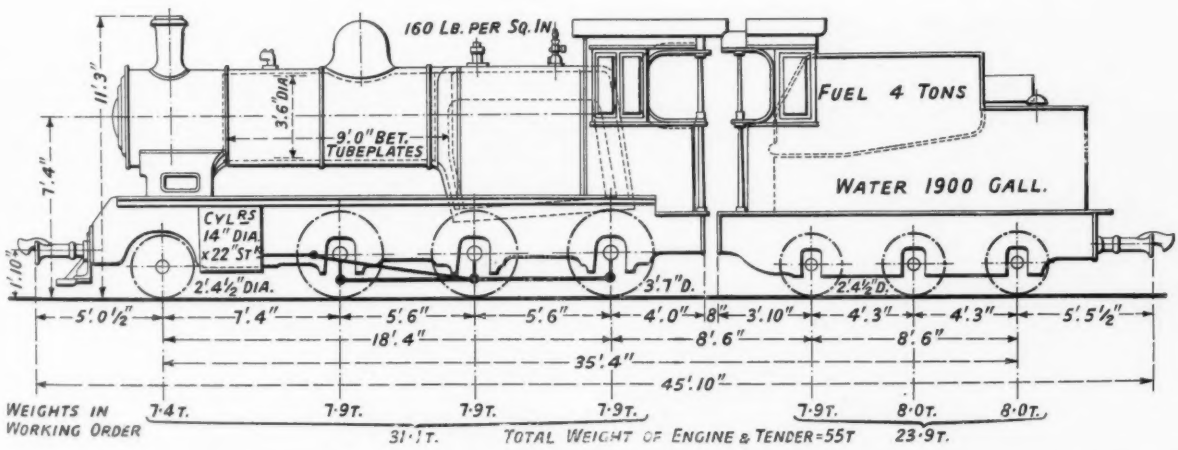



WE are indebted to the Hunslet Engine Co. Ltd. for a photograph, dimensioned drawing and particulars of one of six YK class 2-6-0 type superheated locomotives with six-wheeled tenders recently constructed for branch line service on the metre gauge Assam-Bengal Railway. Three of the engines, which have been built to the Indian standard specification under the inspection of Messrs. Rendel, Palmer & Tritton, Consulting Engineers, Westminster, are fitted with Caprotti poppet valve gear and the tenders with Timken roller bearing axleboxes; the other three engines having R.C. poppet valve gear and the tenders Skefko roller bearing axleboxes. The particulars and weights are generally similar, except that the R.C. valve gear locomotives are some 15 cwt. heavier than those fitted with the Caprotti valve gear. The illustrations show the Caprotti valve gear locomotive, and the table of dimensions given below relates to this type of locomotives, the only difference between the two being the weight.

The Belpaire boiler carries a working pressure of 160 lb. per sq. in., and has an inside firebox of copper. There are 67 small tubes $1\frac{3}{4}$ in. diameter, and 12 flue tubes of $5\frac{1}{4}$ in. diameter, and the length between the tubeplates is 9 ft. 0 in. The top two rows on each side of the firebox are fitted with flexible water space stays. The extended smokebox rests on a saddle casting with the steam pipes partly external and carried through the sides of the smokebox, giving a direct course to the cylinders.

The boilers are equipped with the latest type of superheater with multi-valve regulators supplied by the Superheater Co. Ltd., a Clyde sootblower placed above the firedoor, two Evrit type blow-off cocks, one on the underside at the leading end of the boiler and one on the throatplate, two Ross pop safety valves, top feed clackbox fed on the left-hand side by a Davies & Metcalfe No. 6 exhaust steam injector, and on the right-hand side by a Gresham & Craven No. 7 S.A. injector, and a firedoor of Staybrite heat resisting alloy. All the steam fittings are arranged on a stand on the top of the firebox outside the cab and controlled where necessary from the footplate. A master valve is fitted on the steam stand for isolating the fittings if required whilst the boiler is in steam.

The locomotive is equipped with Wakefield's A.C. type lubricators, and Lambert wet sanding gear serves the leading and driving wheels. Stone's electric turbo-generator supplies the headlamp engine and tender buffer lamps and cab lights. The Vacuum Brake Co.'s equipment is fitted, the vacuum cylinder on the engine being




***Dimensioned diagram of one of the 2-6-0 type superheated locomotives for the Assam-Bengal Railway***

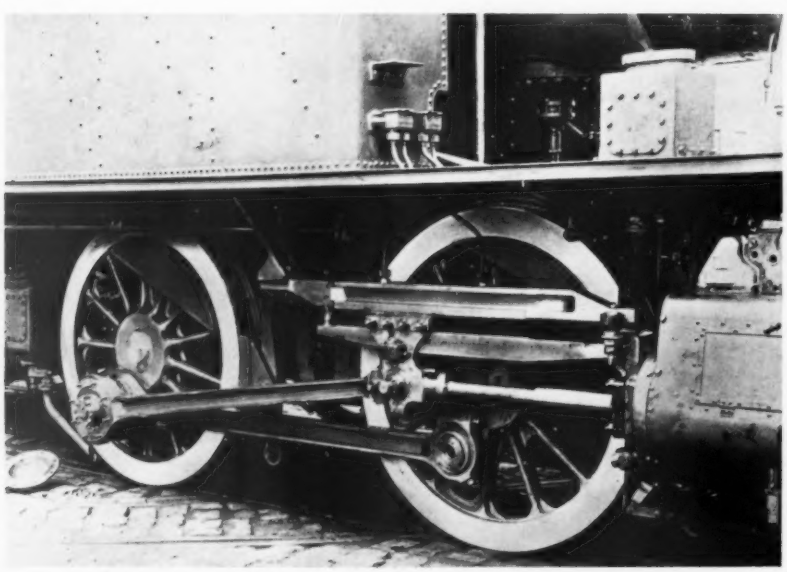
supported inside the frames between the leading and driving wheels. The draw-gear is of the A.B.C. combined buffer and coupler type.

The following are the leading dimensions:—

| | |
|---|---|
| Cylinders, diameter | 14 in. |
| ,, stroke | 22 in. |
| Coupled wheels, diameter | 3 ft. 7 in. |
| Bogie wheels, diameter | 2 ft. 4½ in. |
| Rigid wheelbase (engine) | 11 ft. 0 in. |
| Total wheelbase (engine) | 18 ft. 4 in. |
| Total wheelbase (engine and tender) | 35 ft. 4 in. |
| Height from rail to top of chimney | 11 ft. 3 in. |
| Extreme width | 8 ft. 6 in. |
| Heating surface:— | |
| Small tubes | 276 sq. ft. |
| Large tubes | 149 ,, |
| Firebox | 70 ,, |
| Total | 495 ,, |
| Superheater | 101 ,, |
| Total | 596 ,, |
| Grate area | 14 ,, |
| Working pressure | 160 lb. per sq. in. |
| Tank capacity of tender | 1,900 gallons |
| Fuel capacity of tender | 4 tons |
| Weight empty (engine) | 28·7 tons |
| ,, ,, (tender) | 11·5 ,, |
| Weight in working order (engine) | 31·1 ,, |
| ,, ,, ,, (tender) | 23·9 ,, |
| ,, ,, ,, (engine and tender) | 55·0 ,, |
| Total weight of coupled wheels | 23·8 ,, |
| Maximum axle load | 7·9 ,, |
| Tractive effort at 75 per cent. of boiler pressure | 12,035 lb. |
| Tractive effort at 85 per cent. of boiler pressure | 13,650 lb. |
| Minimum radius of curve | 358 ft. |

The weight of the engine fitted with R.C. valve gear is 29·5 tons empty and 32 tons in working order.

*A fine painting by the late Herr Hans Baluschek entitled "Above the House Tops," to which we refer in an editorial note on page 1194*



## Indian Locomotives with Roller Bearing Rods

*The accompanying illustration shows the coupled wheels and rods of a class XT 0-4-2 side tank engine built by Friedrich Krupp A.G. for service on Indian 5-ft. 6-in. gauge railways. These engines are fitted with S.K.F. roller bearings in the rod ends; which, we understand, are the first roller bearings applied to any locomotive crank pins on main line railways outside the United States. Though the engines are not of any great power, the application of these bearings is, nevertheless, a matter of interest. The engines of this class are fitted with Caprotti valve gear. Some similar locomotives were illustrated and described on page 23 of "The Railway Gazette" dated July 1, 1932, but the engines in that case were not equipped with roller bearing rods*

# NEW STREAMLINED LOCOMOTIVES, CANADIAN NATIONAL RAILWAYS

***Stated to be the largest streamlined locomotives in the world, these engines, five in number, are designed for a speed of 100 m.p.h.***

THE first of a series of five 4-8-4 type partly streamlined express locomotives for the Canadian National Railways, No. 6400, left the shops of the builders, the Montreal Locomotive Works, recently. They will be used between Montreal, Toronto, and Sarnia on the route of the International Limited, and are said to be capable of 100 m.p.h.

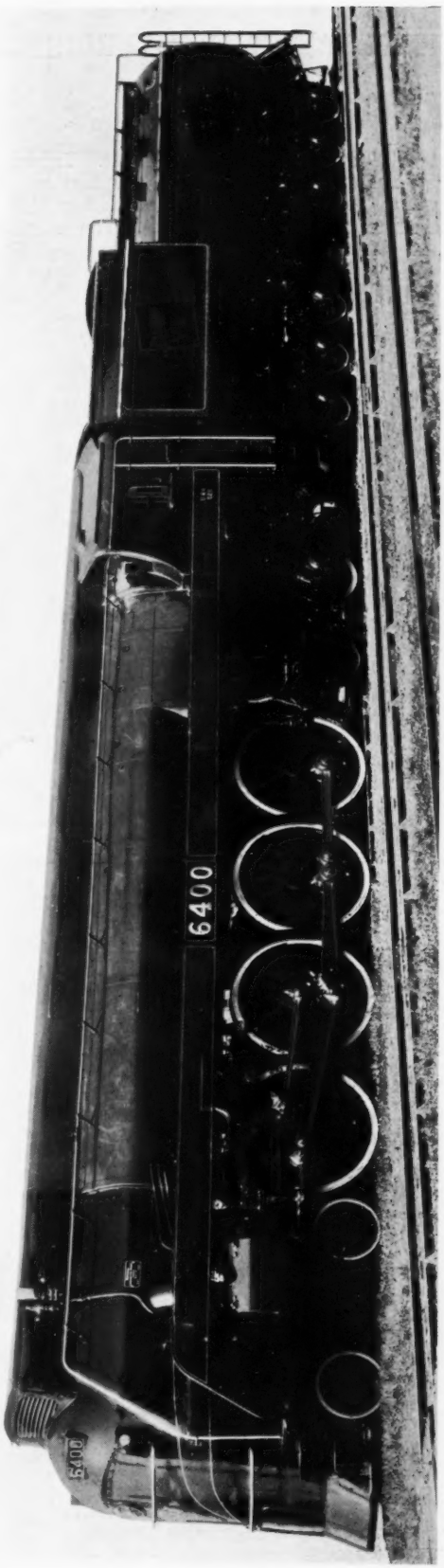
The new engines are a development of the 6100 class of 4-8-2 engines streamlined after exhaustive wind tunnel and other tests by the National Research Council at Ottawa and the Motive Power Department of the C.N.R. The new locomotive presents a striking appearance. The chimney and bell, in the front of which are louvres designed to cause an upward draught to lift the smoke and exhaust clear of the cab, are concealed by the streamlining. The automatic coupler when not in use disappears behind a door in the front of the locomotive. The air pump and headlight generator are located on the front deck inside the covering to which access is provided by a side door. The whistle is installed outside of the streamlining as required by the railway operating regulations. The front of the locomotive is black as are also the wheels, the rims of which are aluminium colour. The apron of the running board, the cab and tender are in standard Canadian National passenger car green with gold stripes, and the boiler covering is of planished steel. The number of the locomotive appears in bronze on a red background on the running board apron. The C.N.R. trade mark appears in red with gold lettering on the tender.

Some of the main features of the locomotive are: Overall length 94 ft. 8 in.; capacity of tender, water 11,700 imperial gallons, coal 20 tons. Driving wheels, diameter 6 ft. 5 in. Boiler, inside diameter, first course 6 ft. 6 in., outside diameter of largest course 7 ft. 2 in. Working pressure 275 lb. per sq. in. The maximum tractive power of the new locomotives is 52,000 lb. The firebox is 10 ft. 6 in. by 7 ft. 0 in. and the combustion chamber is 4 ft. 1 in. long, with grate area of 73·7 sq. ft. The boilers on these locomotives are similar to those used on the 5700 Hudson type fast passenger engines but with longer barrel and combustion chamber. SKF roller bearings are used on the leading and trailing bogie wheels of the engine and those of the tender.

Two Thermic syphons are installed in the firebox. The superheater is the Schmidt type E. The whistle is pneumatically operated from a valve in the engine cab, and the regulator valve is the American multiple type with compensating lever. A tangential dryer located in the steam dome eliminates most of the water which might be carried over in the steam. All axles and crankpins are of heat-treated carbon steel.

The driving wheels on the new locomotives have Boxpok centres of the semi-disc type, which are claimed to retain their trueness for a longer period than the spoked type of wheel. The driving wheels of the locomotive are cross-counter-balanced with floating bush bearing on the connecting rod big ends, also on all side rod connections and driving and intermediate axle boxes.

On the right hand side the driver's front window is of the Kent clear vision type, comprising a disc of high-grade glass which revolves at high speed ensuring clear vision at all times. A track sprinkler is located under the tender for use in laying dust on the roadbed.




*New Canadian National 4-8-4 partly streamlined express locomotive*

# AN INTERESTING REINFORCED CONCRETE RAILWAY OVERBRIDGE

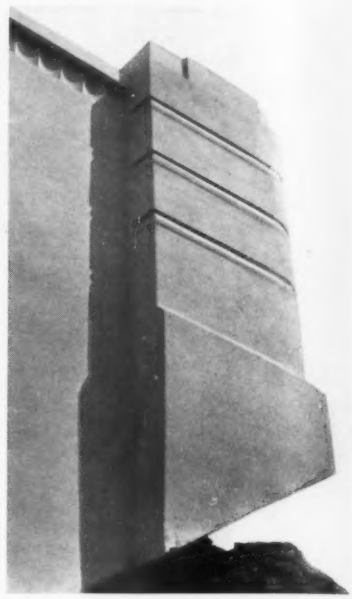
## *New arched bridge over Southern Railway at West Worthing*

FOR the dual purpose of connecting a new building estate to the north of the main Brighton-Portsmouth coast line of the Southern Railway at West Worthing with the sea front, and eliminating a level crossing, a new road bridge has just been constructed. Authority has been given also for a new station to be built adjacent to the bridge to serve the estate.

Economy in every respect has been met by the choice of the arch design of bridge by the engineers to the estate. Further, the contingent liabilities which arise where the railway has sufficient land to enable it at any future time to lay down a total of four lines of rails are provided for by this construction. The new bridge will accommodate a loading gauge 56 ft. wide by 15 ft. 6 in. high, with a road level at the summit which does not exceed that necessary in a beam construction. Filling for the approaches is a problem at Worthing and the use of the arch design has not added anything to the cost of providing for the 1 in 30 ramps on each side of the bridge.

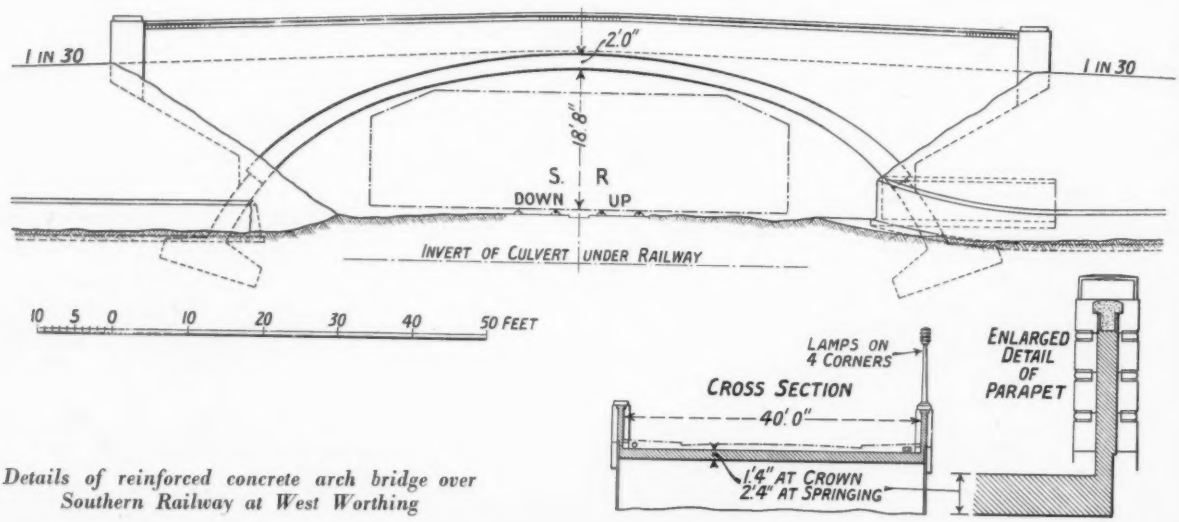
The bridge has been constructed by Peter Lind & Co. Ltd., of Westminster, in reinforced concrete. The elliptical arch has a span of 97 ft. 4 in. between the springings. The foundations are reinforced and integral with the arch slab, the bearing surfaces being splayed so that they are at right angles to the line of thrust. The maximum bearing pressure as designed was 3·1 tons per sq. ft., but owing to weather difficulties during the winter decreased to 2·75 tons per sq. ft. The width of the bridge between parapets is 40 ft. to accommodate a 24 or 26 ft. carriage way.

The superintending engineers were Messrs. Henry Greenly, A.I.Loco.E. and K. H. Greenly, B.Sc., engineers to the estate, and the ornamental detail was prepared by the consulting architects to the Field Place Estate, Messrs. Yates, Cook & Darbyshire of London. The whole work has been carried out under the supervision of Mr. George Ellson, O.B.E., Chief Engineer of the Southern Railway.



*Above: The finished bridge, before completion of filling for approaches*

*Right: Detail of newel*




*Details of reinforced concrete arch bridge over Southern Railway at West Worthing*

# RAILWAY NEWS SECTION

## PERSONAL

KING'S BIRTHDAY HONOURS

*Baron*

Sir Henry Strother Cautley, Bt., K.C., M.P. for East Grinstead since January, 1910. For political and public services. Has frequently been Chairman of Private Bill Committees dealing with important transport schemes.

*G.C.V.O.*

Viscount Charles Cheers Wakefield, C.B.E.

*Knight Bachelor*

Mr. Herbert Nigel Gresley, C.B.E., D.Sc., M.Inst.C.E., M. I. Mech. E., M. I. E. E., M.I.Loco.E., Chief Mechanical Engineer, London & North Eastern Railway.

*C.M.G.*

Mr. David Henry Elias, M.C., General Manager, Federated Malay States Railways.

Mr. Thomas Joseph Hartigan, F.I.C.A., Commissioner for Railways, State of New South Wales.

*C.I.E.*

Mr. Arthur Neville John Harrison, Chief Auditor, Bombay, Baroda & Central India Railway.

Mr. Lewis Hawker Kirkness, D.S.O., O.B.E., V.D., Secretary, Indian Railway Board.

*O.B.E. (Military Division)*

Lt-Col. James Ronald Roberts, M.C., R.E., formerly Indian State Railways, and until more recently Instructor, Railway Training Centre, Longmoor.

*O.B.E. (Civil Division)*

Major John Cormack Craig, D.S.O., M.Inst.C.E., Director of Public Works, British Guiana.

Mr. Ernest Wilfred Head, lately General Manager, Ceylon Government Railway.

Mr. Thomas Leggatt Paterson, Senior Staff Officer, Ministry of Transport.

*M.B.E. (Civil Division)*

Mr. Manser William Bartlett, Superintendent Engineer, Transport Department, Nyasaland Protectorate.

Mr. John Blanc Harvey, Higher Clerical Officer and Assistant to the Private Secretary to the Minister of Transport.

Mr. Charles Edwin Holmes, lately Officiating District Controller of Stores, Eastern Bengal Railway.

Mr. Edward Walter Lamden, Station Superintendent, Burma Railways, Rangoon.

SOUTHERN RAILWAY COMPANY SECRETARYSHIP

Mr. F. H. Willis is relinquishing the secretaryship of the company at the end of this month (June 30) and the directors have appointed Major L. F. S. Dawes to fill the vacancy thus created as from the 1st proximo. Mr. Willis is the second son of the late Judge Willis, K.C., and was educated at Haileybury College and Trinity Hall, Cambridge, taking the degree of B.A. in 1893, and M.A. in 1930. He entered the Inner Temple in 1894, and was called to the Bar in 1897. Two years later he joined the South Eastern & Chatham Railway in the Goods Manager's Department, dealing specially with rates and legal aspects of rates disputes. Under Sir Francis Dent, when Goods Manager, Mr. Willis was closely associated with several important cases. He appeared before the Russell Rea Commission in 1909, and was preparing a proof for submission to the 1913 Royal Commission on Railways when the war put an end to its sittings. He succeeded Mr. F. P. Igglesden as Goods Manager in 1920. When the Southern Railway was formed in 1923, Mr. Willis became the Indoor Commercial Manager, which position he held until appointed Secretary to the company in March, 1930. He was closely connected with, and gave evidence at the inquiry of the Rates Advisory Committee in 1920 into the principles governing the fixing of tolls, rates and charges and classification of merchandise traffic. He took an active part in the protracted proceedings before the Rates Tribunal on the Revision of Rates and Charges, which terminated in 1927, giving evidence on behalf of the Southern Railway. Mr. Willis was Chairman of the Goods Managers' Conference in 1923 and 1929, as well as Chairman of the Superintendents' (Coaching) Conference in 1926. He is a foundation member of the Institute of Transport and has served on the Council.

*Mr. Frank H. Willis, M.A.*

Secretary to the Southern Railway Company, 1930–36

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Sir James Williamson, Kt., V.D., M.I.E. (India), Agent of the Bengal & North Western and Rohilkund & Kumaon Railways, has just retired after 38 years' service in India. Sir James was born in Fifeshire and in October, 1898, arrived in India, where he was first engaged on construction works on the Bengal Dooars Railway. On the completion of those lines in 1903, he was transferred to the Bengal & North Western Railway, and was occupied for a number of years with the survey, preparation of projects, and construction of various new lines in the United Provinces and Behar. He subsequently held charge of the Mansi Division of the Tirhut State section, became Chief Engineer in 1920, and in 1928 assumed control as Agent of the combined B. & N.W. and R. & K. Railways. These railways are company-owned but combined with them are the Tirhut and the Lucknow-Bareilly State Railways, which are managed by the company on behalf of the Government of India. Sir James was President of the 1934-35 session of the Indian Railway Conference Association, when he was also Chairman of the Hardinge (Lower Ganges) Bridge Committee appointed by the Government of India to advise and devise measures for the safety of that bridge. The great earthquake which, in January, 1934, devastated North Behar,

played havoc with some 900 miles of the railway in that Province. The rapid repairing of the damaged lines and reopening of communications carried out by the B. & N.W.R. staff under Sir James, was an outstanding feature of the restoration work. On his arrival in India, Sir James joined the Northern Bengal Rifles (Volunteers) and later the Gorakhpur Light Horse which was subsequently embodied with other detached troops in the United Provinces Horse. He commanded the Gorakhpur Squadron from 1922 to 1928, when he took over command of the B. & N.W. Railway Auxiliary Force. He was also Honorary A.D.C. to the Governor of the United Provinces. The honour of knighthood was conferred on him at New Delhi on March 1, 1935. He is a Member of the Institution of Engineers, India.

*Sir James Williamson, Kt., V.D.*

Agent of the Bengal & North Western and Rohilkund & Kumaon Railways, 1928–36

*Col. J. C. Ward, C.M.G., C.I.E., M.B.E., D.S.O.,*

Recently appointed Director-General of the Iraq Railways Administration

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Colonel J. C. Ward, C.M.G., C.I.E., M.B.E., D.S.O., who, as announced in THE RAILWAY GAZETTE of May 15, took over charge as Director-General of the Iraq Railways on March 30-April 1, was appointed a Sub-Lieutenant in the Royal Indian Marine in 1899, and served with that unit and the Royal Navy until 1914. He was then seconded to the Bengal Government as Deputy Port Officer and Shipping Master, Calcutta; but in the following year was ordered to Mesopotamia (Iraq) and appointed Marine Transport Officer, Base, and Controller, Native Craft. In June, 1916, Col. Ward became Director of River Transport, and in December of that year, was seconded with relative rank to the Royal Engineers, and appointed Deputy Director, Inland Water Transport: he was promoted to officiate as Director in 1918. In the following year he was appointed Port Director, and, in 1922, Director-General of Navigation. In 1924 he also became Director-General of Dredging Operations, and in addition to his other duties has now been appointed Director-General of Railways. During the war Col. Ward was mentioned in despatches eight times and was awarded the M.B.E. (Civil), D.S.O., C.I.E., and C.M.G.: he is a Member of the Institute of Transport.

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We regret to learn of the recent death, at the age of 74, of Dr. Francisco Sá, the eminent Brazilian statesman and engineer, who was Minister of Transport from 1909 to 1911 and again from 1922 to 1926. Born in 1862, he graduated at the Mining College in Ouro Preto, in 1884, and shortly afterwards began his political career, which was interrupted in 1889 by the abolition of the monarchical régime and establishment of the republic. Thenceforward, up to the beginning of the present century, he supervised various railways in Minas, and organised and subsequently directed colonisation work in that State. On his return to politics, he was elected Federal Deputy for the State of Ceará, and in 1906 he was elected a Senator, in which capacity, with the exception of his two terms of office as Transport Minister, he remained until October, 1930, when the Washington Luiz Government was deposed. Among the important transportation works for which he was responsible may be mentioned the following:—

The extension of the broad gauge section of the Central Railway of Brazil to Bello Horzonte, and of various narrow gauge sections.

The extension of the E.F. Oéste de Minas (now part of the Rede Mineira de Viacao), giving it access to Bello Horizonte.

The construction of a line connecting the Leopoldina Railway in Rio with the quays of that city.

The development of the E.F. Noroéste do Brasil, including a new bridge over the Parana River in Jupia.

The conversion of the Corcovado Railway in Rio from steam to electric traction.

The intensification of services on navigable rivers and development of docks at Rio and Santos, with incidental dredging and drainage operations.

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Mr. J. R. Sadler, who, as announced in our issue of June 12, has been appointed Assistant to the Superintendent (Trains), North Eastern Area, L.N.E.R., entered the service of the former North Eastern Railway as junior clerk in the

***Mr. J. R. Sadler,***
Appointed Assistant to Superintendent (Trains) North Eastern Area, L.N.E.R.

*Bacon]* *[Newcastle*

***Mr. E. F. Wilkinson,***
District Passenger Manager, Newcastle N.E.R. and L.N.E.R., 1902-36

***The late Mr. P. St. J. Bishop,***
District or Divisional Engineer, Central, Southern Railway, 1912-36

***Mr. H. J. Snook,***
Parcels and Cartage Agent, Paddington, G.W.R., 1931-36

***Mr. D. G. MacCormack, B.Sc.,***
Appointed Assistant Chief Engineer, Central Uruguay Railway

***Mr. E. Myatt, M.C.,***
Appointed Locomotive Running Superintendent, Central Argentine Railway

Chief Goods Manager's office in 1910. He worked in various sections of that office, in the District Goods Manager's office at Leeds, and at a number of stations up to the outbreak of the war, and then served with the 17th Battalion, Northumberland Fusiliers (N.E.R. Battalion) from 1914 until demobilised with the rank of Captain and Adjutant in 1919. In July, 1919, Mr. Sadler trained as a traffic apprentice and was engaged chiefly on docks work at West Hartlepool, Blyth, and on the Tyne, and he also acted as Assistant Yardmaster at West Hartlepool for one year during his training period. In June, 1923, he was appointed Assistant Yardmaster at Darlington, and in the following year became Mineral Traffic Controller at Hull. In November, 1926, he was appointed Chief Clerk to the District Superintendent at Leeds, being promoted to be Assistant to the District Superintendent at York two years later. In March, 1933, Mr. Sadler was appointed Assistant District Superintendent at York, whence he is now promoted to be Assistant to the Superintendent. In July, 1925, he was gazetted Captain and Adjutant of Headquarters Docks Group, R.E. (S.R.), and since March, 1933, has commanded No. 157 (L.N.E.) Docks Company, R.E. (S.R.), with the rank of Major.

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Mr. E. F. Wilkinson, District Passenger Manager, Newcastle-upon-Tyne, L.N.E.R., who, as announced in our issue of June 12, retires on June 30, joined the General Goods Manager's office of the former North Eastern Railway at York on July 1, 1887. He was transferred to the General Manager's office, York, in 1890, later acting as Personal Clerk to Sir George S. Gibb. In 1899 he was transferred to the office of the Superintendent of the Line and given control of the Rolling Stock, Train Running and Time Table Departments. In 1901 he was appointed Chief Clerk to the District Superintendent, Newcastle, and on the reorganisation of the Railway in 1902 was promoted to be District Passenger Manager, the position from which he now retires after 34 years' tenure of

*Right: Platform view of Southampton Central station, Southern Railway, showing new concrete lighting standards. Pre-cast concrete posts are being used increasingly in railway work largely by reason of the absence of maintenance charges*

*Left: A Georgian mansion which has just travelled by train. Captain Schreiber, who was Chief Constable of Ipswich until his recent retirement, lived at Brooks Hall, Ipswich, a fine old red-brick house of the Georgian period. Failing to find a similar residence in Somerset, he adopted the suggestion of an Ipswich builder to have his house demolished and re-erected. The result was that 17 wagon loads of bricks and masonry, various fruit trees, bins, and outhouses, and four large container loads of furniture, left Ipswich station by L.N.E.R. for South Cheriton, and Brooks Hall has now been rebuilt exactly as it was, except for certain modern improvements. This is the first time the L.N.E.R. has undertaken to move a house, as well as its contents*

*Right: Flood scene at Hadley Wood station, L.N.E.R., on Sunday last. The main line was flooded to a depth of several feet as a result of a cloudburst on Sunday afternoon. The flooding became serious about 7 p.m., and trains were diverted via Stevenage and Hertford. Over half a mile of line was affected. An S.O.S. was sent to all men in the Engineer's Department, within a radius of 20 miles, and workmen were rushed out from London, with the result that there were soon over 200 men on the job. Practically all the ballast had been washed away, and at one point near Greenwood signal-box a cavity had been scooped out over which rails and sleepers were suspended. Special trains of ballast were rushed to the site, and by Monday morning the lines were fit for traffic*

it, and 49 years' service on the railway. The district he controlled was enlarged in 1911, since when it has included all stations in the North Eastern Area north of the Tees, except Darlington and the section of line between Darlington, Stockton and West Hartlepool. Mr. Wilkinson has identified himself with the following organisations associated with the railway:—

1902: Vice-President of the Railway Institute, Newcastle, and from 1916–36 President.
1902: Vice-President of the N.E.R. Temperance Union, President in 1912 and, since 1924, President of the L.N.E.R. Temperance Union.
Vice-President of the Railway Lecture and Debating Society.
1908: For some years Secretary to the North Eastern League of Riflemen, and a member of the Newcastle Rifle Club and the Harton Moor Rifle Club.
1929: Appointed Trustee to the Railway Convalescent Homes, which position he held until 1935.
1924: Became a member of the Institute of Transport and acted as Chairman of the Newcastle District Branch from 1931 to 1933.

Mr. Wilkinson has also taken an active part in Church matters, and in this connection has held various lay offices in Newcastle, and South Gosforth. In 1933 he was appointed member of the Gosforth Urban District Council.

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We regret to record the sudden death, on June 17, of Mr. P. St. J. Bishop, Divisional Engineer, Central Division, Eastleigh, Southern Railway. Mr. Bishop was born in 1876, educated in Guernsey, and trained at the Crystal Palace School of Engineering. He then became a pupil of Mr. Maurice F. Wilson, at that time engaged upon the construction of the Prince of Wales graving dock and dock extensions at Southampton. Later he entered the service of the London & South Western Railway under Mr. Andrews, then Chief Engineer, being concerned with the Parliamentary and general work of the department. He was subsequently appointed Resident Engineer for the construction of the Bulford branch line, afterwards returning to the Chief Engineer's office, being specially concerned with investigations in regard to the alignment of curves and safe speeds of trains thereon. It was in January, 1912, that he was appointed District Engineer, Central District—the designation being Divisional Engineer, Central Division since January, 1926—with headquarters at Eastleigh.

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Mr. H. J. Snook has retired from the position of Parcels and Cartage Agent, Paddington, G.W.R. He joined the office of the Superintendent of the Line in 1892, and was attached to the rates and fares section, of which he eventually became Chief Clerk. Later, he was transferred to the Divisional Superintendent's office at Paddington as Outdoor Representative, and five years ago was appointed to the position he has now relinquished.

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Mr. D. G. MacCormack, B.Sc., A.M.Inst.C.E., has been appointed Assistant Chief Engineer, Central Uruguay Railway. Mr. MacCormack was born in 1900, and educated at Hillhead High School, Glasgow, and Glasgow University, where he was a member of the Officers' Training Corps, and graduated as B.Sc. (Eng.). After a period of practical training with Messrs. Home and Morton, Consulting Engineers, Glasgow, he joined the staff of Gray's Ferro-Concrete Company, Glasgow, and was employed as Assistant Engineer on several large public works carried out for Glasgow Corporation. During 1922-23 he was employed by P. & W. Anderson Limited, Public Works Contractors, as Assistant Engineer on the construction of the North Devon and Cornwall Junction Railway. In 1924 he joined the Central Uruguay Railway, being at first employed as Assistant District Engineer on the Western and Northern Extensions, and from 1926 to 1929 was engineer in direct charge of the design and reconstruction of a large number of bridges and culverts, damaged or destroyed by floods. In 1929 he was appointed District Engineer, Home Section, and in 1930 he became engineer-in-charge of trackwork in connection with the installation of automatic signalling and track circuiting of main line double track from Central termini. In 1931 he was appointed Outdoor Assistant to the Chief Engineer, and from 1934 to 1935 was Chief Assistant to the Chief Engineer, during which period he acted for the Chief Engineer whilst the latter was on six months' furlough.

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Mr. Ernest Myatt, M.C., has been appointed to succeed Mr. Charles Case as Locomotive Running Superintendent, Central Argentine Railway, as from May 15. Mr. Case's appointment as Stores Superintendent of the railway was announced in THE RAILWAY GAZETTE of that date. Mr. Myatt was educated at Holme Grammar School, Oldham, and studied mechanical engineering at the Manchester School of Technology. He subsequently underwent a three-year course of practical training as a pupil engineer in the Gorton locomotive works of the Great Central Railway, England. On the outbreak of war in 1914, he volunteered for active service, and was gazetted to a commission in the 4th Battalion of the King's Own Royal Lancaster Regiment, with which he served overseas for three years. He was twice wounded, mentioned in despatches, awarded the Military Cross, and promoted to Captain. Mr. Myatt went to Argentina in 1920 to take up an appointment as an assistant in the Locomotive Running Department of the Central Argentine Railway under the Chief Mechanical Engineer. He was subsequently appointed to the Locomotive Control office in Rosario, of which he became Chief in March, 1922. In August, 1923, he was promoted to be Divisional Locomotive Running Superintendent at Pergamino, and in July, 1924, further promotion followed in his appointment to a similar position at Córdoba, which was thereafter his headquarters up to the time of taking up his new appointment.

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We regret to note the death of Mr. Ernest Ifill Shadbolt, sometime Director of Railway Construction to the Government of India, at the age of 84. Mr. Shadbolt was one of the best known survey and construction engineers in India of his time, and the important works with which he was connected extend from southern Madras to the Sind-Pishin mountain railway in Baluchistan, and include the bridging of the Indus. He retired in 1906.

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In addition to Sir G. E. Leguizamon, K.B.E. [who as announced in our issue of June 12 has been appointed Chairman of the new British-Argentine Railway Committee.—ED. *R.G.*] the other members of the committee are:—Engineer Atanasio Iturbe (Chairman, Local Board, Central Argentine Railway); Dr. Luis P. O'Farrell (Chairman, Local Board, B.A. & P.R.); Messrs. Ronald Leslie (General Manager, C.A.R.), M. F. Ryan (General Manager, B.A. & P.R.), C. R. S. Harris (Director-General, B.A.G.S. and B.A.W.R.), and D. M. MacRae (General Manager, Córdoba Central Railway). Mr. MacRae has been elected Deputy-Chairman of the committee, and Mr. A. S. Matthews, Local Secretary. The Secretary of the London Committee is Mr. Robert Graham.

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Mr. N. F. E. Grey, formerly Assistant Secretary, Buenos Ayres Great Southern and Buenos Ayres Western Railways, has been appointed Secretary of those companies in London, in succession to Mr. Robert Graham, who, as recorded above, has been appointed Secretary of the British-Argentine Railway Committee in London.

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Mr. G. D. Ramoni, Chief of the Publicity Department, Central Argentine Railway, sailed for England on leave on June 9.

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Dr. Angel Sanchez Elia, a Local Director and Legal Representative of the Entre Rios and Argentine North Eastern Railways, has been appointed Chairman of the local board of both these companies, in succession to the late Dr. Ezequiel Ramos Mexia.

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Mr. G. E. R. Slade, Controller of Stores, B.B. & C.I.R., resigned from the company's service on June 13, and is succeeded by Mr. H. D. Henman.

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Messrs. R. V. Rowles, M.I.Mech.E., and F. James Fielding have been elected to the board of directors of Fielding & Platt Limited, Engineers, Gloucester. Mr. James Fielding is a representative of the fourth generation of the Fielding family in this business, which was founded in 1866 by his great grandfather, the late Samuel Fielding, in partnership with the late Mr. James Platt.

## Improved Clyde Coast Services

With the opening of the 1936 season the Clyde coast steamer timetables experience their biggest revolution since the Armistice. Owing to the fact that several new vessels have been placed in service, and partly because the L.M.S.R. has taken over the fleets of Williamson-Buchanan Steamers and of Turbine Steamers Limited, the railway companies are able to present this year a greatly extended programme of tours, excursions and fast packet services.

An outstanding feature of the reorganised services is the taking over of the Greenock-Inveraray run by the Caledonian Steam Packet Company's *Duchess of Argyll* and *Duchess of Montrose*. This run was previously performed by the *King George V* of Turbine Steamers Limited. This vessel has now gone to Oban to supplement the MacBrayne fleet.

The *Duchess of Argyll* now plys to Campbeltown from Greenock—calling at Lochranza, Arran, on the way—in place of the *Queen Alexandra*, also formerly of Turbine Steamers Limited. In addition, an entirely new daily service (Saturdays excepted) to Campbeltown via Ardrossan is being carried out by the *Glen Sannox*. These two new Campbeltown sailings have made possible the introduction of a new Arran circular tour. Passengers travel to Brodick in the *Glen Sannox*, and motor round the island to Lochranza, where they are picked up by the *Duchess of Argyll* homeward bound from Campbeltown to Greenock. The tour can also be performed in the opposite direction. The old Campbeltown steamer *Queen Alexandra*, which has been renamed *St. Columba*, has been given three funnels, and is now plying on the Glasgow (Bridge Wharf) to Ardrishaig route.

The need for a fast turbine steamer on the new territory served by the railways has necessitated the withdrawal of the *Duchess of Argyll* from the Gourock to Arran via the Kyles of Bute run, on which it has plied since the end of the war. The *Caledonia* has taken over this service. Sailings to Arran via Ardrossan are being given by both the *Glen Sannox* and the new vessel *Marchioness of Graham*.

A large variety of afternoon cruises is offered by the new timetables. The *Marchioness of Lorne* plys from Gourock to the Holy Loch daily, the fare being 1s. The *Mercury* carries passengers from Rothesay, Craigmore and Dunoon to Largs and Millport for fares not exceeding 1s. 6d. Afternoon cruises are also in operation between the principal resorts and the Kyles of Bute, Loch Ridden, and Loch Goil. On certain days the *Caledonia* will sail from the Arran ports to Rothesay and Dunoon, the ticket (if desired) including a reserved seat at the Rothesay Entertainers. Another innovation is the introduction of cheap tickets (on the Arran station) which include the passenger's pier dues.

A considerable extension of the Sunday sailings forms an important item in the new programmes. Hitherto Sunday services have been curtailed owing to the religious beliefs of many of the Clydeside residents, and the lack of facilities has inconvenienced visitors. This year a long sail round Arran to Campbeltown will be performed every Sunday by the *Duchess of Argyll*. The steamer will sail in one direction via the Holy Isle, Pladda and the East of Arran, and in the other via Kilbrannan Sound and the West of Arran. Other cruises, both whole day and afternoon, will cover all the principal resorts. Evening cruises will be advertised from time to time.

In connection with the Clyde sailings a "go-as-you-please" ticket will be issued during the season at the cost of 20s. for eight days. This ticket will include unlimited travel on all sailings of the L.M.S.R., C.S.P., and L.N.E.R. steamers with the exception of the Campbeltown, Lochranza, and Inveraray sailings. A ticket covering the new routes costs an additional 5s. Still another advantage afforded the visitor to the Clyde this year is the opportunity of purchasing a ticket which will allow him to travel from Glasgow to the coast by rail and return to the city by the "all the way" river steamers.

## The Deterioration of Structures in Sea Water

Some results of the very interesting work which has been carried out since 1916 by the Committee of the Institution of Civil Engineers for the Investigation of the Deterioration of Structures in Sea Water are given in the latest report, the fifteenth, reviewed on June 12. The first section of the report deals with timber. A large number of specimens treated in different ways with various preservatives were exposed to the action of the sea in many parts of the world. It was found that the most satisfactory preventive was chloro-dihydrophenarsazine, usually known as D.M., and that the most satisfactory vehicle was ordinary creosote. The impregnation was found to be convenient and generally satisfactory when done by the Bethell or similar method, but the Griffith process, when carried out at a temperature of 150° C., caused a reduction in strength of the timber. Penetration was improved by incising the timber, especially if this were done immediately before creosoting. Painting the surface of the timber proved to be quite useless.

The second section deals with the corrosion of steel and iron. Generally speaking, the corrosion of the various metals in either the half tide or complete immersion positions was very similar, but those in the air, and a few which were tested in fresh water, showed that their composition affected their resistance to deterioration. In all cases the presence of mill-scale accentuated the tendency to deep localised corrosion and pitting, thus weakening the specimens more than in the case of a uniformly distributed action. The addition of 0·6 to 2·2 per cent. of copper to steel improved the resistance only above the water line. By far the best results were obtained under all conditions by steel containing 36·6 per cent. of nickel. It is, however, unfortunate that this is also the most expensive of the materials tested. An electrolitic action was noticeable in the submerged specimens of two metals in contact.

The third section of the report deals with the protection of iron and steel. The specimens were treated with various numbers of coats of preservatives, including tar, bituminous solution, iron oxide paints, and lead paints. Galvanising was also tested. The effect of increasing the number of coats of paint proved to be beneficial in air and under water, but at half tide this did not seem to hold good. Coal tar gave excellent results and proved under all conditions much better than iron oxide or lead paints.

The fourth section is on the deterioration of reinforced concrete, but as this part of the investigation was not started until 1929 the conclusions are not so fully developed. Four types of cement were used, but none showed any special advantage. In the case of leaner mixtures, the addition of trass proved advantageous, but artificial pozzolanas did not appear to be of any definite value. The permeability of the concrete is very important, as signs of rust generally appeared on the surface before cracking started. For this reason a minimum cover of 2 in. of concrete is recommended.

With reference to this last section of the report, it appears to us that the investigation of piles that have been driven should also be undertaken. The specimens so far tested have been supported in the required position, but it is quite possible that due to the shocks sustained by the concrete when being driven, its permeability may be changed, and the rusting of the reinforcement start more easily.

B.S. SPECIFICATION FOR SIGNAL WIRE.—A revision of the British Standard Specification for galvanised steel wire for signalling purposes, No. 163, has just been issued by the British Standards Institution. This publication includes the revised form of B.S.S. No. 163, which was originally published in 1924. Copies can be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

# Signal Engineers' Summer Meeting at Liverpool

(*See also editorial note on page* 1194)

The annual summer meeting of the Institution of Railway Signal Engineers was held at Liverpool on June 19 and 20, members assembling there the evening before at the Adelphi Hotel. The party numbered nearly 100, and was headed by the President, Mr. Walter S. Roberts, Managing Director of the Railway Signal Co. Ltd., whose works are situated in the vicinity at Fazakerley. He was supported by the Vice-President, Mr. H. M. Proud, Messrs. A. F. Bound, E. F. Fleet, F. Downes, C. Carslake, J. W. Punter, C. H. Ellison, R. S. Griffiths and H. E. Morgan (Past Presidents); Messrs. W. R. Jones, J. Boot, H. F. D. Page, A. Moss, R. F. Morkill, F. L. Castle and H. H. Dyer (Members of Council); Mr. M. G. Tweedie (Hon. Secretary); and Mr. T. S. Lascelles (Hon. Treasurer). The arrangements had been made by the Summer Meeting Committee, composed of the President, Vice-President and Hon. Secretary, with Messrs. F. L. Castle, R. S. Griffiths, R. F. Morkill, and C. H. Hills. The last named was unfortunately prevented from attending the meeting.

On June 19 a party assembled at the Central station of the Mersey Railway and was conducted by Mr. J. Shaw, General Manager and Engineer, Mr. Varley, Assistant General Manager, Mr. Dodd, Traffic Superintendent, Mr. Parkin, Superintendent Engineer, and Mr. Beswick, Permanent Way and Signal Inspector, with technical assistants, to see several items of interest; the first—which attracted great attention—was the automatic operation of points at that station, whereby the ordinary movements of departing and arriving trains are effected without the intervention of a signalman.

From Liverpool Central, visitors travelled in the motorman's cab under the Mersey to Hamilton Square and saw the electro-pneumatic multiple-unit control apparatus, in use for 33 years and still giving satisfaction. At Hamilton Square the power signal cabin controlling the junction of the Birkenhead Central and Park lines was inspected, including automatic telephone equipment and electro-pneumatic emergency point and train stop control. The generating station was next visited, where the original reciprocating engines and generators are now kept in reserve, turbo-generator sets being used normally, assisted by a large storage battery to deal with peak demands. The pumping installation which keeps the tunnel free from flooding is extensive, and deals with 5,000 gall. per min. The original slow acting beam pump engines are still kept as a standby and worked for a short period every week.

Whilst this visit was in progress, a party of members and ladies drove through the Queensway road tunnel to Port Sunlight, where about half an hour was spent.

In the afternoon the whole company was received at the Pier Head station of the Liverpool Overhead Railway by the General Manager and Engineer, Mr. W. L. Box, and, entering a special train, was taken to the Dingle terminus, thence to Seaforth Sands station and back to the Pier Head, the journey affording a view of the docks and shipping. Leaving the Pier Head station, the party proceeded to the Town Hall, and was formally welcomed to Liverpool by the Deputy Lord Mayor, Alderman F. T. Richardson, J.P., and Mrs. Richardson, and entertained to tea.

In the evening a dinner was held at the Adelphi Hotel, with Mr. W. S. Roberts in the chair, and distinguished guests, including the Deputy Lord Mayor and Mrs. Richardson; Mr. A. Critchley, M.P. for the Edge Hill Division, and Mrs. Critchley; Mr. G. Leedam, Acting Manager, and Mr. K. C. Marrian, Resident Engineer of the Cheshire Lines; Mr. W. L. Box, Mr. J. Shaw, and ladies.

Mr. Roberts proposed the toast of "The London, Midland and Scottish Railway," which he called the premier line at the risk of alarming those coming from other railways.

Mr. A. F. Bound, Signal and Telegraph Engineer, L.M.S.R., responded. His company was happy to be able to assist in making the meeting a success. It was a wise step to have it in Liverpool, a city so closely connected with the enterprise which Stephenson carried through in practical shape, the Liverpool and Manchester Railway, promoted largely by Liverpool men. On it the first fixed signals were seen, although history did not record whether they were made at Fazakerley. The President of the institution, Mr. Roberts, had done a great work for signalling, here and abroad.

Mr. H. M. Proud, Vice-President, proposed "The Cheshire Lines Committee, Mersey, and Liverpool Overhead Railways" and, in doing so, he thought of the men behind those names who had exerted themselves so much for the members' benefit, and with several of whom he had had the most pleasant professional relations. They had seen something of the romance of railway engineering that day on the Mersey and Overhead lines, both pioneers in more than one direction.

Mr. G. Leedam, responding, hoped that members were satisfied with their meeting and referred to the progress made in recent years in signalling, an example of which they would see at Manchester Central the next day; the installation there had worked to their entire satisfaction.

Mr. J. Shaw expressed the respect he felt for Mr. Roberts as a signal engineer who had helped him constantly for 30 years, and had recommended automatic signalling when the traffic called for it, leading him to get to know Mr. Proud. Mr. Proud, said Mr. Shaw, did not know what track circuit difficulties were till he came on the Mersey Railway, but he overcame them and did everything they asked of him, with the result that in the last twelve months 99·6 per cent. of their trains left Liverpool less than 1 minute late.

Mr. W. L. Box referred to Mr. Proud's work for the Overhead line, and the satisfaction it had ever since afforded them.

Mr. W. S. Roberts then proposed "The City of Liverpool" and referred to its many sided industrial activities, especially in ocean navigation. It financed and managed the *Queen Mary*, though that vessel was not made on the Mersey and unfortunately did not sail from there. The Deputy Lord Mayor responded in a speech touched with humour, and Mr. A. Critchley, M.P., after dealing with some aspects of the city's life with which he was officially connected, observed that the meeting appeared to be a "signal success."

On Saturday morning, June 20, while the ladies made a tour of the city and visited the Cathedral, members were conveyed in special saloons on the Cheshire Lines to Manchester Central, where the all-electric power signalling was inspected. The new cabin replaces four mechanical ones and controls an intricate layout of lines, so that the concentration of working proves decidedly advantageous and economical.

The L.M.S.R. entertained the institution to lunch at the Liverpool Adelphi Hotel, when the chair was taken by Mr. Ashton Davies, Chief Commercial Manager, in the absence of the Vice-President of the company, Sir Harold Hartley, occasioned by indisposition, and for whom Mr. A. F. Bound apologised.

The Chairman, proposing "The Institution of Railway Signal Engineers," referred to the debt the railways owed the signal engineers. Speaking of efficiency, he warned them against unnecessary expense occasioned by too much attention to merely theoretical considerations.

Mr. W. S. Roberts, responding, said the Chairman was not the layman in signalling his modesty led him to make out. He had done a lot for signalling, and was a pioneer in the establishment of signalling schools. They all profoundly regretted Sir Harold Hartley's absence and the reason for it, and desired their thanks conveyed to him and Sir Josiah Stamp for facilities.

After some concluding words of thanks from Mr. Ashton Davies and Mr. Bound, the meeting terminated, all agreeing that it had been one of the most enjoyable in the history of the institution.

# MINISTRY OF TRANSPORT ACCIDENT REPORT

**Woodford and Hinton, L.N.E.R. December 19, 1935**

A through carriage to Stratford-on-Avon, slipped, as usual, from the 6.20 p.m. express Marylebone to Bradford at Woodford and Hinton, collided at about 20 m.p.h. with the main train, which had stopped unexpectedly, telescoping the rear coach about 4 ft. Eleven passengers sustained shock or injuries and the two guards were more seriously injured. It was fine at the time, previous fog having cleared away. Lt.-Col. E. Woodhouse enquired into the accident.

South of the station the line passes through a deep cutting. It is level for 3 furlongs north of Culworth Junction box, then rises at 1 in 176, 1 in 475 and 1 in 176, the station being on the level. The train was drawn by Atlantic engine No. 6086 and consisted of 7 corridor coaches. It was 506 ft. long and weighed about 370 tons including the engine, with steam brake on the latter and vacuum on the train. The slip carriage was a non-corridor one, with brake compartment and slipping gear at each end. The latter equipment comprised special screw coupling, steam heating, and brake connections. The guard pulls a cord to operate this screw coupling by releasing a spring catch on the outer shackle. The brake coupling is more elaborate, consisting of two parts inserted between the ordinary hose couplings. It is held together by vacuum in the train pipe, and prevented from separating when there is none by straps secured to the vacuum pipe on the train and a bracket on the slip coach. There is a plug cock in each half of the coupling to seal the pipes before slipping. The slip guard closes the cock on his coach by pulling a cord, and this turns the lever of the further cock. Spring loaded locking sleeves on the plug spindles engage with the cocks when closed to prevent accidental opening and consequent brake application after slipping. The springs working these sleeves hold the plugs of the cocks home.

This arrangement was designed for vehicles having brake pipes in the position usual on non-corridor stock. The last vehicle of the train was a corridor coach, however, with the brake pipe below the Pullman type gangway, and had another hose connection of usual height above the headstock and well to one side of the centre line. There are a number of vacuum reservoirs on the slip coach to enable the vacuum brake to be used to control it after slipping. At one time the hand brake only was used, the vacuum being kept for emergencies.

The train had no booked stop between Marylebone and Leicester, and slipped one coach at Finmere. Driver E. V. Cawkwell estimated his speed passing Woodford Central distant as about 70 m.p.h. Shortly after passing it the brake was fully applied and the train came to a stand, although he kept the large ejector working. He had not seen the regulation guard's hand signal after slipping; there was usually some difficulty in doing so because of steam in the cutting. He concluded, as it was not too foggy to slip, that something was amiss with the slipping apparatus and the guard wanted him to stop in the station, though the train had never before been stopped for this reason. He did not whistle, as he thought the slip coach was still attached. Twice in the previous six months he had had to stop at Finmere, due, he understood, to incomplete closing of the cock on the train, but he had been able to keep it in motion with the aid of the large ejector until clear of the station. Other drivers had told him of similar experiences.

It was two months after the accident before the guards were fit to give evidence, and the train guard, R. Bonnett, was not a very satisfactory witness, still apparently suffering from shock. He showed the prescribed green light to the driver when the coach was slipped, but his recollection of subsequent events was clearly at fault.

### Slip Guard's Evidence

The slip guard, C. Robertson, said that steam limited visibility in the cutting to 20 yd. On seeing the distant signal off he closed the cocks, giving the cord two pulls. He noticed nothing unusual. He checked the coach with a full brake application, then restored the vacuum. He saw nothing of the train or its tail light before the collision. It was quite usual for the vacuum pipes to separate at Woodford when the cocks were closed, probably because of the piping on the train vehicle being on one side and holding the hose pipes higher than when both are central. The equipment is tested at Marylebone by the Finmere slip guard and a shunter; Bonnett saw this being done that night. The brake pipe couplings had been examined and found in order before being fixed to the train, and after the accident Foreman T. W. Shaw inspected them, finding the train portion damaged and the locking sleeve missing. This was later found on the ballast.

Col. Woodhouse witnessed from a coach in a special train, a slip made at Woodford on January 2, 1936, the vehicle being similar in all respects to those in the accident. The vacuum couplings separated when the cocks were closed, the train hose pipe falling away gently and striking nothing that might knock the cock open, which was later found properly shut and locked. The train was quickly hidden by swirling steam and became invisible at about 30 yd.: the slip coach was brought to a stand smoothly.

Examination of the rear coach of the train showed there were three fittings which the lever of the cock might have struck in falling, in a way tending to open it, without a particularly violent swing of the hose being needed, viz.: the Pullman vestibule, a tail lamp bracket, and a step on the buffer guide. Col. Woodhouse also saw similar couplings being tested at Liverpool Street, where the vacuum pipe was central on the last train coach, and thus opposite that on the slip coach. It was not possible to separate the two portions by pulling or jerking the cord, there being sufficient slack on the hose pipes and supporting straps to allow the slip coach hose to be pressed against the coach without imposing sufficient tension to separate the coupling.

### Inspecting Officer's Conclusions

Colonel Woodhouse holds the primary cause of the accident to have been faulty action of the brake coupling, the cock at the rear of the train being evidently left fairly wide open, since Driver Cawkwell was unable to maintain sufficient vacuum to keep the train moving. Observation confirmed Guard Robertson's statements regarding the behaviour of couplings behind corridor and non-corridor stock. There are two possible explanations of the failure; either the cock on the train was insufficiently turned to lock, and was knocked open when the couplings separated, or else the pull of the cord separated them with the cock on the train partly open, that on the slip coach closing when the hose touched the coach body Col. Woodhouse inclines to the latter explanation, as it is not unlikely that a smart jerk would exert a force in excess of 40 lb., the atmospheric pressure holding the couplings together at 20 in. of vacuum, and if the train cock was at all stiff there would be some leverage tending to prise the couplings apart.

The driver's omission to whistle was unfortunate, but Col. Woodhouse accepts his statement that he thought the slip coach had not been detached. A driver is required to whistle if he finds it necessary to reduce speed or stop after a coach has been detached, to warn the slip guard. There is nothing to indicate that Guard Robertson was not keeping a lookout, and he cannot be blamed for not realising the situation.

### Recommendations

This failure of the coupling and similar failures in the past, indicate that cord-operated cocks cannot always be relied on, and Col. Woodhouse, after his examination of the simpler coupling used by the Great Western Railway, suggested its adoption by other companies, should they re-introduce slip coaches. He also recommended its use on the L.N.E.R. Liverpool Street services, which at present have a hinged draw-hook coupling released by a lever.

# Railway Rates Tribunal

## Review of Standard and Exceptional Charges

The Railway Rates Tribunal, consisting of Mr. W. Bruce Thomas, K.C., President, Mr. H. E. Parkes, and Mr. John Pike (in place of Mr. John Quirey, absent through illness), began on June 18 the 1936 review of standard and exceptional charges.

Mr. Walter Monckton, K.C., who appeared with Mr. Alfred Tylor for the four amalgamated companies, explained that although none of them had in 1935 earned their respective standard revenues they did not wish for any general modification of their charges. He put in, with other statements, the following table showing net revenue compared with standard revenue.

| | Standard revenue and allowances | Net Revenue | | Deficiency | |
|---|---|---|---|---|---|
| | | Year 1935 | Average of years 1933 to 1935 | Based on year 1935 | Based on average of years 1933 to 1935 |
| | £ | £ | £ | £ | £ |
| L.N.E.R. .. .. | 15,215,695 | 8,371,373 | 8,147,546 | 6,844,322 | 7,068,149 |
| L.M.S.R. .. .. | 20,579,930 | 13,027,525 | 11,887,148 | 7,552,405 | 8,692,782 |
| G.W.R. .. .. | 8,466,560 | 5,450,559 | 5,230,040 | 3,016,001 | 3,236,520 |
| S.R. .. .. | 7,095,870 | 6,072,297 | 5,804,143 | 1,023,573 | 1,291,727 |
| Total .. | 51,358,055 | 32,921,754 | 31,068,877 | 18,436,301 | 20,289,178 |

Mr. C. H. Newton, Divisional General Manager, Southern Area, L.N.E.R., giving evidence on behalf of the four companies, said that first class passengers, excluding season tickets, showed an increase of 1,309,791, or 12·93 per cent., in numbers, with an increase in receipts of £184,553, or 6·47 per cent. in 1935 compared with 1934. In third class passengers there was an increase of 21,235,404, or 3½ per cent. with an additional receipt of £1,094,685, or 3 per cent. The reductions made in first class cheap tickets had caused a transfer from third to first class. The reduction of £78,889 in receipts from parcels and excess luggage was more than accounted for by lower receipts from parcels under 2 cwt., caused by reduced scales put in force by the companies to meet the competition of new scales introduced by the Post Office. In merchandise, excluding Classes 1 to 6, there was an increase of £437,427, or 0·91 per cent., and merchandise and minerals in Classes 1 to 6 showed an increase of £59,544, or 0·46 per cent. Live stock receipts were up by £57,073, or 4·8 per cent. Coal, coke, and patent fuel showed an increase of £265,800 or 0·87 per cent. The principal sources of the increased merchandise traffic were the iron and steel industries, the carryings of manufactured and semi-manufactured iron and steel being over £600,000 greater than in 1934. There were also increases in originating tonnage of scrap iron, pig iron, limestone, and chalk. On the other hand, grain and flour tonnage was 308,000 less; gravel and sand were down by 141,000 tons, and road-making materials by 475,000 tons. The increase in live stock traffic was the first shown since 1929, and was in part due to the easing of the Irish Free State tariff situation. For coal, coke, and patent fuel there was a greater demand in the home market, but exports were nearly 2,000,000 tons less. There were decreases to Italy, France and Belgium, but there were increases to the Irish Free State, Germany and Egypt.

In working expenses the increase over 1934 was £614,485, after allowing for credits of £1,100,000 in respect of overcharges on account of rates. Comparing 1935 with 1929 the total decreases in expenditure were:—L.N.E.R. £6,126,250, or 14·15 per cent.; L.M.S.R. £7,648,651, or 13·38 per cent.; G.W.R. £3,126,880, or 13·09 per cent.; S.R. £2,081,329, or 11·45 per cent. Having regard to the fact that a large volume of the traffic expenditure could not be varied in ratio to the business the reductions obtained during the year indicated economy in working and management. The increases of 3·28 per cent. and of 1·18 per cent. in 1934 and 1935 were necessary owing to the increase in business and because of making good a certain amount of work which was postponed during the period of extreme depression. Restoration of part of the 1931 deductions from earnings had increased the 1935 figure by approximately £1,000,000. There had also been increases in the prices of copper, lead, zinc, certain oils, cement, lime, pig iron, and a certain amount of steelwork. The economies in pooling were continuing, and the ultimate total value of those that had so far been effected would amount to about £350,000 a year. The savings in operating expenditure since 1929 had been effected by intensive economy schemes which had not in any way affected efficiency; amongst many advances there had been marked improvements in the timings of both passenger and freight trains. Many more trains were now running at 60 miles an hour and over. Certain indirect results had come to the companies from the exercise of their road powers. They had been able to take off certain passenger services on branch lines working at a loss, to divert to the road short-haul or cross-country traffic which could be more economically conveyed by road, and to make satisfactory arrangements with their subsidiaries. These factors had given economies to the L.N.E.R. of about £99,000 a year, and to the L.M.S.R. of over £90,000 a year. On air services the net loss in 1935 to the L.M.S.R., G.W.R., and Southern Railway Companies, after allowing for floating capital provided, was £44,152. It was necessary to conduct experiments like this which in the initial stages might result in loss. The L.N.E.R. did not operate any air services.

There had been a very marked growth in the use of containers. In 1929 all the railway companies together had only 3,404 containers; by 1935 the number had grown to 11,269. The linked service whereby traffic was collected within 20 miles for traders and worked in connection with the trains now operated from about 1,700 stations throughout the country. The companies were always endeavouring in every possible way to develop economies. One of the latest, tried on a branch line between Knaresborough and Pilmoor, had been the removal of the signals and replacing them with boards; all signal wiring had been eliminated and to that extent it had produced an economy. There were headlights on the train so that the drivers could read the boards from the light. There was an interesting article* which appeared on February 14, 1936, showing the signal boards and how they were worked. The main point was that it eliminated a signalman and it was appreciated by the signal staff. The level crossing gates also had signals. The more intensive use of rolling stock had been rendered possible by workshop and shed rearrangement, which had enabled more and faster trains to be run without a proportionate increase in expenditure. In the workshops there had been introduced a system of progressive repairs, and particularly installing modern machinery; systems of concentration had also been introduced whereby all stock of a particular type had been repaired or maintained in a particular depot. In the running sheds there had been installed mechanical carrying bands, modern washing plant, and modern turntables. The result in terms of statistics was that the number of engine-miles per engine had gone up from 23,363 in 1923 to 24,635 in 1929, and to 25,721 in 1935, representing

* See THE RAILWAY GAZETTE, February 14, 1936, page 292—[ED., *R.G.*]

an increase of 15 per cent. since 1923. The results of experiments with diesel cars indicated that they had advantages in respect of certain classes of traffics, but it was not thought that they would displace steam power generally.

Regarding the amount by which earnings were below the 1929 level, trade depression had in the past been an important factor, but without doubt today road competition was the serious factor operating against the railways. Rail loadings had not kept pace with the improvement in trade. In comparison with 1930 there was a fall in the average receipts per net ton-mile, which reflected the twofold effect of competition, namely the predominant loss of short-distance traffic and also the process of rate reduction necessary to retain traffic. The Road and Rail Traffic Act had had no appreciable effect on road competition. There was a great deal of competition in the lower classes by road; for example, a great number of bricks were going by road direct from the brick yards to the building sites. Then he thought there was a tendency on the part of road operators to deal with their rates more on the basis of what the traffic would bear rather than on the direct costs, as they had done in the past.

For 1936 he thought it was probable that any increase in the gross revenue of the railways would be largely offset by additional expenditure in respect of wages and coal and hardening of prices.

At the conclusion of the proceedings on June 19, the President said that in accordance with the usual practice, the tribunal would put its conclusions into writing; but as the review had been unavoidably delayed this year, it would be convenient to state its conclusions in a few words. It was clear that there was a deficiency in the case of each company. The tribunal was satisfied that in the case of no company was the deficiency due to want of efficiency or economy in management. It was of opinion that the deficiencies would continue, but that any general modification of charges would not enable any of the companies to achieve its standard revenue. In view of these conclusions the tribunal did not propose to make any general modification of the standard or exceptional charges.

## Forthcoming Events

June 26 (*Fri.*).—East Indian Railway Officers, at Trocadero Restaurant, Piccadilly Circus, London, W.1, 6.30 for 7 p.m. Annual Dinner.

July 2 (*Thurs.*).—Institution of Electrical Engineers, at Natural History Museum, Cromwell Road, London, S.W.7, 8.30 p.m. Annual Conversazione.

July 4–9.—Permanent Way Institution, at Plymouth. Annual Convention.

July 8 (*Wed.*).—Diesel Engine Users' Association, at Loughborough College, Loughborough. Summer Meeting.

July 15 (*Wed.*).—Institution of Electrical Engineers, Savoy Place, London, W.C.2. Conversazione and Reunion of Overseas Members.

## Railway Staff and Labour Matters

The National Union of Railwaymen and the Railway Clerks' Association have now referred to the Railway Staff National Council the claims which they submitted to the railway companies last autumn—and which were the subject of negotiations, first with the Railways Staff Conference and later with the general managers. Both the unions are claiming the termination of the existing percentage deduction from earnings, but the National Union of Railwaymen is claiming, in addition, the restoration of the rates of payment for overtime, night duty, and Sunday duty, which operated prior to the issue of National Wages Board Decision No. 119 in March, 1931. It is understood that the Railway Staff National Council will meet next week to consider the claims.

The council was established under an agreement of February, 1935, and, up to the present, has held only two meetings. It consists of eight representatives of the railway companies (two nominated by each of the main-line railway companies) and eight representatives of the trade unions (four nominated by the National Union of Railwaymen, two by the Associated Society of Locomotive Engineers and Firemen, and two by the Railway Clerks' Association).

A considerable surprise has been caused by the announcement that the Associated Society of Locomotive Engineers and Firemen, which was associated with the other two railway trade unions in the recent negotiations, and whose claim was then similar to that of the National Union of Railwaymen, has decided not to refer its claim to the Railway Staff National Council, at present. There had been every indication that the three railway trade unions would continue to act jointly in taking their claims to the next stage of the machinery, but the General Secretary of the society, acting, it is understood, in accordance with a decision taken at the society's annual assembly of delegates in May last, has just submitted to the four main-line railway companies a comprehensive programme on behalf of locomotive men. This includes the following items:—

1.—Cessation of the existing percentage deduction from earnings.

2.—Reduction of the standard working day from eight hours to six hours.

3.—Sunday duty to be paid for at double-time rate.

4.—Night duty, *i.e.*, duty between 10 p.m. and 4 p.m., to be paid for at the rate of time-and-a-half.

5.—Day overtime to be paid for at the rate of time-and-a-half.

6.—Twelve days' annual holidays, exclusive of Sundays, with full pay.

With the exception of the first, all these proposals are entirely new and negotiations in regard to the whole of the claim will, in accordance with the scheme of machinery, take place first of all at a joint meeting between representatives of the society and the Railways Staff Conference. Mr. W. J. R. Squance, who has been appointed to succeed Mr. J. Bromley, as General Secretary of the Associated Society of Locomotive Engineers and Firemen, referred, during a weekend speech at Derby, to the decision of his society's annual assembly of delegates to reject the terms of the proposed wage settlement which was recently under review. Mr. Squance is reported as having said "It was too late in the day to question the decision of the delegate conference. Opinions would differ profoundly as to the wisdom of that rejection. In the matter of a six-hour day, the society was giving a lead to the whole trade union movement."

"Southern for the Basking."—Critics of Southern Railway poster art, who have been heard at the company's general meetings to allege a certain obscurity therein, will have less difficulty with the pictorial means adopted for reinforcing the new slogan—"Southern for the Basking." The baskers selected (male and female) are devoting themselves to the pursuit with unquestionable thoroughness. Adam, the lord of his species, proves his mental activity by improving his leisure moments with the study of a book, and affirms his far-sighted prudence by protecting his head from the beneficent but potent rays of the Southern sun. Eve, on the other hand, leaves her holiday literature neglected by her side, and of the drowsy speculations whereby she now beguiles the time, the artist gives no hint. The poster of the lady is signed by "Yunge," and that of the man by "Sheilds." At the risk of appearing ungallant, it may be permissible to express a preference for the colouring of the latter. The colouring, be it understood, refers to the posters as a whole, and not the figures, both of which are suitably tanned by the basking facilities of the Southern Railway.

The United Steel Companies Limited.—The London office of the United Steel Companies Limited will be moved on Monday, June 29, to 8 and 10, Grosvenor Gardens, S.W.1; telephone Sloane 4833. The office represents the following branches and associate companies: Steel, Peech & Tozer, Sheffield; Samuel Fox & Co. Ltd., Sheffield; United Strip & Bar Mills, Sheffield; Appleby-Frodingham Steel Co. Ltd., Scunthorpe; Daniel Doncaster & Sons Ltd., Sheffield; Workington Iron & Steel Company, Workington; the Rothervale Collieries, Treeton; United Coke & Chemicals Co. Ltd., Workington; and Thos. Butlin & Co. Branch, Wellingborough.

# RAILWAY AND OTHER MEETINGS

## Mexican Railway Co. Ltd.

The half-yearly meeting of the Mexican Railway Co. Ltd. was held at Winchester House, Old Broad Street, E.C., on June 24, Mr. Vincent W. Yorke, Chairman of the company, presiding.

The Secretary, Mr. C. Tennant, read the notice convening the meeting and the auditors' report.

The Chairman, in moving the adoption of the report and accounts, said that he regretted his remarks could be no more cheerful than they were last year. There was no fault to find, however, in the company's gross receipts, which had increased by over 11 per cent., the increase being well spread over all classes of traffic. The increase in gross receipts in the last few years had been really remarkable. In 1932 they were 3,900,000 pesos for the second half-year, compared with the present figure of over 6½ million pesos, meaning an average increase of 440,900 pesos in each of the last six half-years.

To counteract these results, incessant agitation by employees had diverted earnings into the pockets of the company's servants. Expenses had been enormously swollen by payment of wages for the seventh day. Thus, while gross receipts had increased by 11·18 per cent., working expenses were higher by 20·45 per cent. (due in part to the allocation of 4 per cent. of gross receipts to renewals account). There was left the paltry sum in sterling of £4,566, towards £88,000 required by debenture and other interest. The company had been successful a second time in disposing of the coupon of the 40-year non-interest bearing bonds. This was equivalent to receipts of 351,223 pesos, which would be added to the receipts for the current half-year—estimated at probably not more than 150,000 pesos by themselves.

It was being found increasingly difficult to handle traffic with the existing equipment. Seventy more freight cars were now being asked for in addition to the 50 ordered last year. Road competition had increased with the completion of the motor road from Mexico City to Vera Cruz, and new stock was necessary to effect the prompt deliveries which were desirable in order to combat it. Much of the locomotive stock, too, was obsolete, and of inadequate capacity. It was very difficult to accede to requests for replacements, because the only money the company earned was in depreciated pesos, whereas new stock had to be paid for in American dollars or English pounds.

There was continuous unrest in the Mexican labour world. Strikes were invariably settled in favour of the employees, and this had had a discouraging effect in business circles. There was no evidence of a readiness on the part of the Government to assist in easing the situation. There had, however, been a steady increase in tourist traffic to the country, the company's share of which was now improving after the falling-off eighteen months ago.

There had been salvage of rails to the value of nearly £20,000 on the abandoned Pachuca-Tampica line, and this material would be used for relaying the Puebla branch. Reference was also necessary to the accident of April 6 last (when a passenger train was derailed by a bomb as it approached a bridge over a ravine). The company's servants had done everything possible, both at the time and later in reopening the line for traffic. The motive behind the outrage remained a complete mystery. At such a time, the loss of the locomotive and cars was very serious, although the locomotives could be repaired and some of the value of the cars that were burned could be recovered under the company's policies of insurance.

A cable just received from the General Manager stated that tourist bookings from the U.S.A. were increasing. Generally speaking, prospects for the next half-year were encouraging provided stable conditions continued. The political and general situation was unchanged. To June 14 there had been increases of 16 per cent. in passenger traffic, 17 per cent. in sleeping cars, 9 per cent. in local freight, 5 per cent. in foreign freight, and 8 per cent. in pulque. The only decreases were 6 per cent. in express traffic, and 5 per cent. in oil fuel.

The report and accounts were unanimously adopted.

## The Great Western of Brazil Railway Co. Ltd.

The annual general meeting of the Great Western of Brazil Railway Co. Ltd. was held at River Plate House, Finsbury Circus, E.C., on Wednesday, the Chairman, Mr. G. H. Harrison, C.M.G., M.Inst.C.E., presiding. The Secretary, Mr. A. J. Medlycott, read the notice convening the meeting and the auditors' report.

The Chairman's speech stated that the results for 1935 did not differ greatly compared with the final sterling figure in 1934, in spite of the fall of 27 per cent. in the exchange rate, a factor entirely beyond their control. Another satisfactory harvest, coupled with judicious modifications in the tariffs and stringent economies in the working expenses, had enabled them to earn sufficient to cover the debenture interest and sinking fund charges. The debit to net revenue account, arising on exchange differences, turned what would have been a small surplus over their fixed charges into a deficit, which, added to that brought forward from 1934, left a debit balance to be carried forward, amounting to £206,557. They had carried over 20 per cent. more goods and passengers in 1935 than in the previous year, for a sterling profit of £6,764 less, due almost entirely to the fall in exchange. The average receipts per ton-kilometre of goods in currency were only 4 per cent. less, and per passenger-kilometre 8·7 per cent. less than in the previous year—their total receipts in currency being approximately 21 per cent. higher than in 1934.

As a result of his (the Chairman's) visit to Brazil, measures had been adopted which should lead to considerable improvement in the condition and strength of the traction material. Dr. Gudin had inspected the line and had sent a personal cable to the President urging upon him the importance of the railway to the country, and in particular the desirability of a loan for maintaining so valuable a national property in an efficient condition. A reply was received to the effect that the railway's position was now being examined by the President, from whom an early reply was expected.

In the traffic department, on the resignation of the traffic manager, Dr. Odir dias da Costa, to take another appointment, they had promoted Mr. Dobson, who joined their service seven years ago with an excellent earlier record in England. As to working expenses, it was only right to emphasise that the reduced expenditure of the last few years had been attained largely by postponing works of renewal and improvement, which, in normal times, would and should have been carried out.

The report and accounts were unanimously adopted.

NEW N.Y.C. STREAMLINED TRAIN.—The New York Central Railroad streamlined, all air-conditioned train—The Mercury—for the Cleveland–Toledo–Detroit service, which was referred to in our issue of January 10, has now been completed. The seven coaches are of lightweight steel construction, and the streamlined Pacific locomotive is a development of the design initiated by the company's *Commodore Vanderbilt*. Its 6-ft. 7-in. disc-type driving wheels and the silvered connecting rods are permanently floodlit from under the streamlined casing. An illuminated sign showing the name of the train is carried on the rear parlour-observation car. The whole train is painted dark grey, with silver striping. Roller bearings are fitted to the bogie, trailing and tender axles of the engine, and to all axles of the coaches. Noise-reduction, interior lighting, and smoothness of operation when starting, stopping, and at speed have been specially studied.

# NOTES AND NEWS

**New Fish Transport from Wick to London.**—For the first time "cooler" vans were used on June 17 for the rail transport of fish from Wick to London. Arrangements have been made with the L.M.S.R. for an experimental Drikold container service for kippers during the summer months.

**Travel Association: Change of Address.**—The Travel and Industrial Development Association of Great Britain and Ireland has moved to 6, Arlington Street, S.W.1. The telephone number is Regent 6173. The new offices are near both Piccadilly and St. James's Street, and the nearest underground station is Green Park.

**Southern Railway Station Changes.**—Worthing is to be re-named Worthing Central; Reedham halt (between Purley and Smitham) converted into a station and known as Reedham; and a new station, to be known as Hersham, built between Esher and Walton-on-Thames. Hersham is to be opened on September 28 concurrently with the introduction of the winter train service.

**Leicester Square Station.**—Two new stairway entrances to Leicester Square tube station were opened recently. They provide access to and from the booking hall and Cranbourn Street and Charing Cross Road, making five entrances in all. The new entrances are approximate at the points where were the entrances to this station prior to its reconstruction last year; it was illustrated in THE RAILWAY GAZETTE of May 3, 1935.

**Hull Paragon Station Signalling.**—The L.N.E.R. is carrying out a scheme of signalling alterations at Paragon station, Hull. In order to bring the signalling arrangements into line with current practice, it has been decided to provide a system of colour-light signalling instead of modernising the existing semaphore signalling system. The full scheme provides for the amalgamation of the existing Park Street and Paragon signal boxes, the construction of a new signal box, and the track circuiting of the whole of the running lines between West Parade signal box and the platforms in Paragon station.

**New York Rapid Transit.**—A concrete plan for the unification of the New York City traction undertakings has been published. Under this scheme Brooklyn–Manhattan Transit preferred stockholders would receive an equal par value of Board of Transit Control first mortgage 4¼ per cent. bonds, and common stockholders would receive $55 par value second mortgage 5½ per cent. B.T.C. bonds. The Interborough Rapid Transit Company's common shareholders would receive $35 par value 4¾ per cent. second mortgage 4¾ per cent. B.T.C. bonds. In our issue of November 8 last (page 807) we recorded that tentative agreement had been reached for the City of New York to take over the working of the entire elevated and underground railway system there.

**Fatal Spanish Railway Collision.**—The night express from Madrid to Galicia on June 23 collided in the single line Fragas tunnel near Ponserrada, Leon, with a goods train. The driver and the fireman of the express engine, and 16 others were killed, and many more seriously injured.

**London Underground Ticket and Change Machines.**—After months of experiment, the London Passenger Transport Board has decided to order 65 combined ticket-issuing and change-giving machines for service on the underground railways. A test machine has been in service for some time at the Bank station. The 65 combined machines are part of orders about to be placed for 135 ticket machines of various types. When these have been delivered more than 1,000 machines will be in service.

**Canadian Railway Bill Passed.**—On June 21 the Canadian Senate passed the Railway Bill, which, as explained in these columns previously, substitutes a board of management for the three trustees hitherto responsible for the control of the Canadian National Railways. Though denouncing the Bill as a dangerous precedent, tending to make the State-owned railway system serve political ends, and though stoutly defending the policy of the trustees, which they claimed had been successful and creditable, Mr. Meighen, the Opposition leader and other Conservatives did not press for a division upon it.

**G.W.R. Wins Horticultural Prizes.**—Entries received from the Great Western Railway Home Farm attached to the company's Tregenna Castle Hotel met with striking success at the recent Royal Cornwall Agricultural Show held at St. Ives. First-class awards were obtained for French beans, cabbage, and tomatoes; second-class for carrots and the best collection of vegetables; and third-class for cucumbers. In the classes for pigs, first prize was awarded the Welsh boar *Dean the First* and third prize for a Welsh gilt. In spite of the very heavy entry, Guernsey cows entered by the G.W.R. were "commended" and "highly commended."

**"Life in a Booking Office."**—The Railway Club held its monthly meeting on June 11 at the Royal Scottish Corporation Hall, Fetter Lane, E.C.4, when Mr. E. C. Codd read an interesting paper on "Life in a Booking Office." Dealing with the historical aspect, Mr. Codd described Edmonson's inventions, which remain today the basis of ticket printing and dating. Mr. Codd then referred to the various items of booking office furniture, and the general system of selling and accounting for tickets. A description of the daily work for each train at the Down office at Oxford station, G.W.R., gave those present an insight into "life in a booking office."

**More G.W.R. Irish Sailings.**—In view of the development of traffic between Britain and the Irish Free State, the G.W.R. announces that, with the introduction of the summer train service on July 6, the tri-weekly sailing by direct boat between Fishguard and Waterford will be restored. The sailings from Fishguard harbour will be on Monday, Wednesday, and Friday nights, and from Waterford (Adelphi Wharf) on Tuesday, Thursday, and Saturday evenings.

**Barrow-Piel Branch to be Closed.**—The L.M.S.R. announces that the passenger and goods train services between Barrow-in-Furness and Piel will be withdrawn on and from July 6; Rampside and Piel stations, which are on a branch line three miles long, will be closed. Parcels traffic from and to Piel and Rampside will be collected and delivered by motor from Barrow Central station. Facilities for goods and coal traffic to these places will be afforded at Roose station in the case of heavier traffic, and at Barrow in the case of light goods traffic.

**Irish Railway Shopmen.**—Railway engineering shopmen employed by the Great Southern Railways outside of Dublin are receiving a five per cent. restoration, in two stages, of the ten per cent. hitherto prevailing deduction from earnings. The first 2½ per cent. restoration was made on June 23, and the second portion will be restored on the first pay day in September. An arrangement for restoration of cuts has already been made with shopmen in the Dublin area. These arrangements, both for Dublin and the provinces, will continue without revision until the end of September, 1937.

**Scarborough Station Improvements.**—The L.N.E.R. has decided to improve the frontage at Scarborough station and also the booking and inquiry offices. The walls and railings surrounding the station yard are to be removed and flower beds will take their place. In the station itself the present inquiry, booking, and telegraph offices are to be abolished and a central office erected in their place where passengers will be able not only to book their tickets, but also to reserve seats, make inquiries, and dispatch telegrams. The reconstruction of this part of the station will also improve the circulating area.

**London Transport (District Line) Sports.**—Chiswick General competitors did well in the annual sports meeting of the London Transport (District Line) Athletic Association last Saturday. The L.P.T.B. high jump handicap went to A. W. Collard (5 ft. 4 in.); the 880 yards L.P.T.B. handicap to R. H. Aird (2 min. 1 sec.); and the two miles L.P.T.B. flat handicap to A. L. M. Phipps (10 min. 0⅕ sec.). The District Line itself won the L.P.T.B. 100-stone tug-of-war from Tottenham Garage, and a member of the association,

S. H. Shirley, received the Agnew Cup for the best individual performance. The L.P.T.B. 1-mile relay was won by the Central Buses team, with Chiswick General and the Metropolitan Railway second and third. The prizes were presented by Mrs. John Cliff, and the thanks of the visitors to the organisers of the event was expressed by Mr. John Cliff, Member of the Board. Mr. A. J. Ryman, Chairman of the Athletic Association, proposed a vote of thanks to Mrs. Cliff.

**L.N.E.R. Sports.**—Under a blazing sun the 16th annual L.N.E.R. Championships were held on the Great Eastern Amateur Athletic Association's ground at Loughton, Essex, on Saturday last, June 20. A very good afternoon's sport was enjoyed by both the competitors and their friends, and seven out of 13 championships changed hands. In the two-mile walk, R. Edon, of the Engineer's Department, Middlesbrough, beat the record by completing the course in 14 min. 45⅕ sec. Among those present were Mr. William Whitelaw, Sir Charles Batho, Mr. C. H. Newton, Mr. J. Ryan, and Mr. H. H. Maudlin. In introducing Sir Charles Batho, who presented the prizes, Mr. Mauldin paid tribute to the untiring efforts of Mr. Stan. Frost, the Honorary General Secretary, and to the other officials and members of the association.

**Road Accidents.**—The Ministry of Transport return for the week ended June 20 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year :—

| | Killed, including deaths resulting from previous accidents | | Injured | |
|---|---|---|---|---|
| England ... | 116 | (97) | 4,679 | (3,966) |
| Wales ... ... | 10 | (6) | 206 | (188) |
| Scotland ... | 8 | (15) | 416 | (438) |
| | 134 | (118) | 5,301 | (4,592) |

The total fatalities for the previous week were 99, as compared with 115 for the corresponding period of last year.

## British and Irish Traffic Returns

| GREAT BRITAIN | Totals for 25th Week | | | Totals to Date | | |
|---|---|---|---|---|---|---|
| | 1936 | 1935 | Inc. or Dec. | 1936 | 1935 | Inc. or Dec. |
| L.M.S.R. (6,917 mls.) | £ | £ | £ | £ | £ | £ |
| Passenger-train traffic... | 528,000 | 517,000 | + 11,000 | 10,769,000 | 10,706,000 | + 63,000 |
| Merchandise, &c. ... | 496,000 | 454,000 | + 42,000 | 11,796,000 | 11,144,000 | + 652,000 |
| Coal and coke ... | 219,000 | 213,000 | + 6,000 | 6,213,000 | 5,977,000 | + 236,000 |
| Goods-train traffic ... | 715,000 | 667,000 | + 48,000 | 18,009,000 | 17,121,000 | + 888,000 |
| Total receipts ... ... | 1,243,000 | 1,184,000 | + 59,000 | 28,778,000 | 27,827,000 | + 951,000 |
| L.N.E.R. (6,332 mls.) | | | | | | |
| Passenger-train traffic... | 344,000 | 341,000 | + 3,000 | 7,036,000 | 7,016,000 | + 20,000 |
| Merchandise, &c. ... | 323,000 | 316,000 | + 7,000 | 8,017,000 | 7,734,000 | + 283,000 |
| Coal and coke ... | 218,000 | 204,000 | + 14,000 | 5,917,000 | 5,663,000 | + 254,000 |
| Goods-train traffic ... | 541,000 | 520,000 | + 21,000 | 13,934,000 | 13,397,000 | + 537,000 |
| Total receipts ... ... | 885,000 | 861,000 | + 24,000 | 20,970,000 | 20,413,000 | + 557,000 |
| G.W.R. (3,746½ mls.) | | | | | | |
| Passenger-train traffic... | 219,000 | 213,000 | + 6,000 | 4,492,000 | 4,469,000 | + 23,000 |
| Merchandise, &c. ... | 196,000 | 191,000 | + 5,000 | 4,662,000 | 4,468,000 | + 194,000 |
| Coal and coke ... | 93,000 | 94,000 | − 1,000 | 2,561,000 | 2,506,000 | + 55,000 |
| Goods-train traffic ... | 289,000 | 285,000 | + 4,000 | 7,223,000 | 6,974,000 | + 249,000 |
| Total receipts ... ... | 508,000 | 498,000 | + 10,000 | 11,715,000 | 11,443,000 | + 272,000 |
| S.R. (2,154 mls.) | | | | | | |
| Passenger-train traffic... | 351,000 | 339,000 | + 12,000 | 6,786,000 | 6,747,000 | + 39,000 |
| Merchandise, &c. ... | 67,000 | 64,500 | + 2,500 | 1,517,000 | 1,506,500 | + 10,500 |
| Coal and coke ... | 26,000 | 23,500 | + 2,500 | 810,000 | 758,500 | + 51,500 |
| Goods-train traffic ... | 93,000 | 88,000 | + 5,000 | 2,327,000 | 2,265,000 | + 62,000 |
| Total receipts ... ... | 444,000 | 427,000 | + 17,000 | 9,113,000 | 9,012,000 | + 101,000 |
| Liverpool Overhead ... (6½ mls.) | 1,348 | 1,308 | + 40 | 28,473 | 28,292 | + 181 |
| Mersey (4½ mls.) ... | 3,655 | 3,613 | + 42 | 101,096 | 100,092 | + 1,004 |
| *London Passenger Transport Board ... | 567,700 | 545,600 | + 22,100 | 27,900,500 | 27,527,000 | + 373,500 |
| IRELAND | | | | | | |
| Belfast & C.D. pass. (80 mls.) | 3,109 | 2,715 | + 394 | 49,771 | 50,714 | − 943 |
| ,, ,, goods | 591 | 475 | + 116 | 13,608 | 12,303 | + 1,305 |
| ,, ,, total | 3,700 | 3,190 | + 510 | 63,379 | 63,017 | + 362 |
| †Great Northern pass. (543 mls.) | 11,200 | 10,500 | + 700 | 211,200 | 205,000 | + 6,200 |
| ,, ,, goods | 8,600 | 8,050 | + 550 | 233,700 | 222,900 | + 10,800 |
| ,, ,, total | 19,800 | 18,550 | + 1,250 | 444,900 | 427,900 | + 17,000 |
| †Great Southern pass. (2,076 mls.) | 37,206 | 37,479 | − 273 | 726,710 | 718,770 | + 7,940 |
| ,, ,, goods | 37,188 | 36,555 | + 633 | 989,969 | 935,083 | + 54,886 |
| ,, ,, total | 74,394 | 74,034 | + 360 | 1,716,679 | 1,653,853 | + 62,826 |

* 51st week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year ; last year's figures are, however, adjusted for comparative purposes
† 24th week.

## British and Irish Railways Stocks and Shares

| Stocks | Highest 1935 | Lowest 1935 | Prices June 24, 1936 | Prices Rise/Fall |
|---|---|---|---|---|
| G.W.R. | | | | |
| Cons. Ord. ... | 55½ | 44½ | 47½ | — |
| 5% Con. Prefce. ... | 124 | 108 | 118 | −1½ |
| 5% Red.Pref.(1950) | 117 | 106¾ | 111½ | — |
| 4% Deb. ... ... | 118½ | 108 | 112* | −2 |
| 4½% Deb.... ... | 122 | 110 | 116½* | −2 |
| 4½ Deb. ... ... | 129½ | 118 | 123½* | −2 |
| 5% Deb. ... ... | 140¼ | 130 | 136½* | −2 |
| 2½% Deb.... ... | 82¼ | 68½ | 76* | −1 |
| 5% Rt. Charge ... | 137 | 128 | 131½* | −3 |
| 5% Cons. Guar. ... | 136¾ | 120½ | 130½ | −1 |
| L.M.S.R. | | | | |
| Ord. ... ... | 25 5/16 | 16 | 23 | — |
| 4% Prefce. (1923) | 58¼ | 43½ | 68½ | −1 |
| 4% Prefce. ... | 87½ | 73½ | 84½ | −1½ |
| 5% Red.Pref.(1955) | 107 | 97¾ | 107½ | — |
| 4% Deb. ... ... | 110¼ | 99½ | 107 | −½ |
| 5% Red.Deb.(1952) | 119 11/16 | 111 5/16 | 116½ | — |
| 4% Guar. ... | 105⅝ | 95½ | 103 | −1 |
| L.N.E.R. | | | | |
| 5% Pref. Ord. ... | 15⅞ | 8¼ | 10 | — |
| Def. Ord. ... ... | 7 9/16 | 4¾ | 5 | — |
| 4% First Prefce. | 74¾ | 48 | 66½ | −½ |
| 4% Second Prefce. | 31¾ | 16¼ | 24 | −1 |
| 5% Red.Pref.(1955) | 92¼ | 71 | 92½ | −2 |
| 4% First Guar. ... | 103 11/16 | 93 | 100 | −½ |
| 4% Second Guar. | 98¾ | 82½ | 94 | −1½ |
| 3% Deb. ... ... | 86 | 75 | 82 | −1 |
| 4% Deb. ... ... | 109¼ | 98½ | 106 | −1 |
| 5% Red.Deb.(1947) | 118¼ | 106½ | 112½ | — |
| 4½% Sinking Fund Red. Deb. | 112½ | 108 | 109 | +1 |
| SOUTHERN | | | | |
| Pref. Ord.... ... | 87½ | 69⅜ | 91 | −1 |
| Def. Ord. ... ... | 25 13/16 | 16¾ | 22½ | — |
| 5% Prefce. .... | 124 | 108¼ | 120 | −1½ |
| 5% Red.Pref.(1964) | 117¾ | 109½ | 118½ | — |
| 5% Guar. Prefce. | 136½ | 121½ | 130½ | −1 |
| 5% Red.Guar.Pref. (1957) | 121¼ | 112½ | 119½ | — |
| 4% Deb. ... ... | 116¾ | 107 | 110½ | −½ |
| 5% Deb. ... ... | 138 | 130¼ | 136½ | — |
| 4% Red. Deb. 1962–67 | 115 | 106½ | 112 | −1 |
| BELFAST & C.D. | | | | |
| Ord. ... ... | 9 | 4 | 6 | — |
| FORTH BRIDGE | | | | |
| 4% Deb. ... ... | 111¼ | 104¼ | 104½ | — |
| 4% Guar. ... ... | 109⅞ | 104 | 104½ | — |
| G. NORTHERN (IRELAND) | | | | |
| Ord. ... ... | 20 | 7 | 16½ | — |
| G. SOUTHERN (IRELAND) | | | | |
| Ord. ... ... | 57½ | 14½ | 59½ | — |
| Prefce. ... ... | 50 | 25¼ | 60½ | — |
| Guar. ... ... | 88¾ | 51¼ | 85⅞ | −⅛ |
| Deb. ... ... | 86¼ | 70 | 89¾ | +1 |
| L.P.T.B. | | | | |
| 4½% "A" ... | 130 | 119¾ | 123½ | — |
| 5% "A" ... | 139¾ | 130 | 133½ | — |
| 4½% "T.F.A." ... | 113¾ | 108 | 109 | — |
| 5% "B" ... | 131½ | 122¾ | 127 | — |
| "C" ... ... | 109½ | 91 | 102 | — |
| MERSEY | | | | |
| Ord. ... ... | 23⅛ | 9¼ | 25½ | — |
| 4% Perp. Deb. ... | 100½ | 93½ | 99½ | — |
| 3% Perp. Deb. ... | 75½ | 67 | 76 | — |
| 3% Perp. Prefce. | 62 | 47¼ | 64½ | — |

* ex dividend.

# RAILWAY AND OTHER REPORTS

**London Midland & Scottish Railway.**—The directors of the London Midland & Scottish Railway Company at their meeting on June 25 had under consideration the payment of an interim dividend on the 5 per cent. redeemable preference stock (1955), due in the ordinary course on July 1; and, having regard to the fact that the stock ranks *pari passu* with the company's 4 per cent. preference stock, they decided to follow the course adopted the last three years, and defer the matter until their meeting on July 30, when the traffic results for the full half year will be available.

**Egyptian Delta Light Railways Limited.**—No dividend has been declared on the five-and-a-half per cent. cumulative preference shares for the year ended March 31 last. For 1934-35 1 per cent. was declared.

**Guaranty Trust Company of New York.**—The board of directors declared on June 3 a regular quarterly dividend of 3 per cent. for the quarter ending June 30, 1936, payable July 1, 1936, to stockholders of record on June 5, 1936.

**West of India Portuguese Guaranteed Railway.**—Revenue from the railway and harbour amounted in 1935 to Rs. 20,85,982, against Rs. 29,78,644 in 1934, but expenditure was reduced from Rs. 17,22,309 to Rs. 12,80,715, leaving a net revenue of Rs. 8,05,267 which converted into sterling produced £61,652. A dividend of 2½ per cent. actual in respect of the half-year ending June 30, is to be paid on July 15, together with a bonus distribution of 1 per cent. actual, making a total payment of 3½ per cent. for the half-year.

**Leopoldina Terminal Co. Ltd.**—Net revenue for 1935 amounted to £1,406 (against £14,364 for 1934). In order to meet the interest on the 5 per cent. first debentures the Leopoldina Railway Company has been called upon to pay £43,284 under its guarantee. In May, 1935, debenture-holders agreed to the suspension of the sinking fund. Gross receipts in currency increased by 3·76 per cent., but working expenses in currency advanced by 11·22 per cent. The increase in expenses is due to the higher cost of coal, both Cardiff and national, heavier maintenance charges on ferry boats, and increased wages. In the maritime section receipts increased by 5·06 per cent., but expenses by 22·38 per cent. Receipts of the tramway section (including omnibuses) improved by 2·37 per cent., and expenses increased by 4·60 per cent.

**General Electric Co. Ltd.**—The directors announce that profits for the year ended March 31, 1936, amounted to £1,485,153, which compares with £1,184,483 for 1934-35. After crediting £467,018 brought forward and providing for depreciation (£298,813), contribution to pension fund (£43,772), transfer to reserve (£100,000), preference dividends (£193,725), and other items, there remains an available balance of £1,117,031. It is proposed to pay a dividend of 10 per cent. and a bonus of 5 per cent. on the ordinary share capital, which will absorb £436,536, leaving £680,495 to be carried forward. During the past year increased activities in almost every one of the company's departments have led to new record trading results. The company's export business shows a further advance.

**Western Welsh Omnibus Co. Ltd.**—This company, which is in association with the Great Western Railway Company, obtained for the year ended March 31, 1936, a net profit, after providing for depreciation, of £45,173 (against £26,958 for the previous year), out of which the directors propose to appropriate £3,000 to employees' assistance fund, £34,800 to a dividend of 10 per cent., and £7,373 to undivided profits account. For the previous year the dividend was 7½ per cent. and the sum of £7,777 was carried to undivided profits account. During the year under review 58,000 additional shares of £1 each have been issued at par. The following additional businesses have been acquired during the year: W. T. Jones, Bryncethin; F. J. John, Nantyffyllon; Pontyberem Motor Services; Thomas White & Co. (Cardiff & Barry) Ltd.; C. J. Vincent (Cardiff) Limited; Danygraig Omnibus Services Limited. A garage to accommodate 22 buses has been erected at Carmarthen, and a garage to accommodate 8 buses is in course of erection at New Quay.

**James Keith and Blackman Co. Ltd.**—The net profit for the year ended March 31, 1936, was £30,588, compared with £23,916 for the previous year. After crediting £10,559 brought in and providing for preference dividend there is an available balance of £39,035. The directors recommend a dividend on the ordinary shares at the rate of 15 per cent., and propose to write off £3,000 for land and buildings at Arbroath and to transfer £3,000 to reserve, leaving £10,160 to be carried forward. For the previous year the dividend was 12½ per cent. The amount of business done exceeded that of the drevious year.

# QUESTIONS IN PARLIAMENT

### Anglo-Argentine Railways

Sir N. Grattan-Doyle on June 18 asked the Secretary of State for Foreign Affairs whether the Argentine Congress had yet passed an amended traffic consolidation law of which the provisions were acceptable to the representatives of the Anglo-Argentine railways.

Viscount Cranborne (Under Secretary).—My hon. friend is doubtless referring to the Transport Co-ordination Bill which was passed by the Argentine Chamber of Deputies last session and was to come before the Senate when Congress reassembled in May. The Secretary of State has received no further information with regard to the progress of the Bill, but His Majesty's Ambassador at Buenos Aires is being requested to report by telegraph whether the measure has yet come before the Senate and, if so, with what result.

### Railway Reconstruction

Mr. Lyons asked the Minister of Transport if he would state the places on the L.M.S.R. where reconstruction was made a condition of the financial arrangements of 1935, and the places where such work had commenced.

Mr. Lyons also asked the Minister of Transport if he would state the places on the L.N.E.R. at which reconstruction was made a condition of the financial arrangements made in 1935, and the places where such work had commenced.

Mr. Hore-Belisha, replying to both questions.—As regards the first part of each question I would refer my hon. friend to the First Schedule to the Railways (Agreement) Act, 1935, and also, so far as the London and North Eastern Railway is concerned, to the First Schedule to the London Passenger Transport (Agreement) Act, 1935. As regards the second part of each question, arrangements have been made for periodical returns to be furnished by the companies of work begun and labour employed on these schemes as soon as the Parliamentary powers which are necessary for many of them have been obtained under the Bills now before Parliament.

# Parliamentary Notes

### Progress of Railway Bills

The House of Lords Standing Orders Committee has decided that the further Standing Orders not complied with in respect of the L.N.E.R. (General Powers) Bill ought to be dispensed with and the Bill allowed to proceed subject to the inclusion of a clause to the effect that any agreement relating to the transfer of the Tyne docks undertaking be conditional upon its being approved by the proprietors of the railway company in general meeting. The Bill was read a second time in the House of Lords on June 23 and has been committee to a Select Committee. The L.M.S.R. Bill was read a third time, with the amendments, and passed in the House of Lords on June 23, and returned to the Commons. A Select Committee of the House of Lords has been formed to meet on June 30 and deal with the Manchester Ship Canal and the L.N.E.R. (General Powers) Bill. The Committee will consist of Lord Milne (Chairman), the Duke of Northumberland, and Lords Annaly, Wolverton, and Monkswell.

# OFFICIAL NOTICES

**(a) The Bengal and North Western Railway Co. Ltd.**

**(b) The Rohilkund & Kumaon Railway Co. Ltd.**

THE Directors are prepared to receive Tenders for the supply of :—
(a) 400 FOUR-WHEELED WAGONS (I.R.C.A. Type M.C.3.);
(b) 40 Do. Do.
(a) 800 PAIRS WHEELS AND AXLES FOR WAGONS;
(b) 80 Do. Do.
as per Specifications to be seen at the Company's Offices.

Tenders addressed to the undersigned, and envelope marked "Tender for Wagons / Wheels and Axles" as the case may be, with name of firm tendering, to be lodged not later than Noon on the 31st day of July, 1936.

For each Specification a fee of £1 will be charged which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,
W. R. IZAT,
Managing Director.
Secretary.

237, Gresham House,
Old Broad Street,
London, E.C.2.
22nd June, 1936.

**South Indian Railway Company Limited**

THE Directors are prepared to receive Tenders for the supply of :—
STEELWORK FOR BRIDGES
(13-150 ft. Through Spans).

Specifications and Forms of Tender will be available at the Company's Offices, 91, Petty France, Westminster, S.W.1.

Tenders addressed to the Chairman and Directors of the South Indian Railway Company Limited, marked "Tender for Steelwork for Bridges," with the name of the firm tendering, must be left with the undersigned not later than 12 Noon on Wednesday, the 15th July, 1936.

The Directors do not bind themselves to accept the lowest or any Tender.

A charge, which will not be returned, will be made of £1 for each copy of the Specification.

Copies of the drawings may be obtained at the Offices of the Company's Consulting Engineers, Messrs. Robert White & Partners, 3, Victoria Street, Westminster, S.W.1.

E. A. S. BELL,
Managing Director.

91, Petty France,
Westminster, S.W.1.
24th June, 1936.

LONDON firm specialising in supply Railway Track Tools and Appliances desires handle additional lines. Established connection railways in England and Overseas. Close touch with Continent, Far and Near East and South America.—Write Box P.312, SCRIPP'S, South Molton Street, London, W.1.

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OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to :—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

# CONTRACTS AND TENDERS

Hudswell Clarke & Co. Ltd. has received an order for 12 diesel locomotives for New Zealand, also an 88 h.p. and two 20 h.p. diesel locomotives for industrial purposes in the Midlands.

### Steam Railcars for South America

The Sentinel Waggon Works (1936) Limited has received an order for two 36-seater steam railcars, fitted with vertical type oil-fired boilers for the Leopoldina Railway.

F. Morton & Co. Ltd. has received an order from the Nyasaland Railways for a steel single-track truss girder semi-through span.

Leyland Motors Limited has received orders as follow : Great Southern Railways, Ireland, four Cubs ; South African Railways, 26 Hippos.

The Selson Machine Tool Co. Ltd. has received an order from the Chinese Government Purchasing Commission for a motor-driven portable boring bar for the Canton-Hankow Railway.

The contract for the construction of the Red Hill to Port Pirie section of the future Red Hill to Port Augusta trunk line in South Australia, 26¾ miles in length, has been placed with Mr. C. D. Timms, of Melbourne. The new line will be of 5 ft. 3 in. gauge.

The South Indian Railway Administration has placed the following orders : Guest, Keen & Nettlefolds Limited, 45 tons of split cotters ; and I.C.I. Metals Limited, 9 tons of copper rods and tubes, and brass rods and fittings.

W. Boby & Co. Ltd., of 62/4, Brook Street, London, W.1, has received a contract from the L.N.E.R. for a water softening plant to be installed at the Southend locomotive depot.

W. R. Payne & Sons, of Singerfield, Shipley, Yorks., has received a contract from the L.N.E.R. for painting the stations on the Ilford-Woodford branch. The work is to be completed by the end of August.

The L.N.E.R. is about to place large orders for goods wagons.

The L.N.E.R. has recently placed orders for 1,030,000 gall. of creosote oil with the following : Creosote Producers Export Association (W. Waugh & Co. Ltd.), 780,000 gall. ; Scottish Tar Distillers Limited, 125,000 gall. ; Summer & Co., 125,000 gall.

The L.N.E.R. has ordered from D. Wickham & Co. Ltd., of Ware, a 36-seat petrol trolley for conveying permanent way gangs. The new trolley completes the equipment for the reorganisation of the maintenance of the L.N.E.R. main and branch lines between Galashiels and Carlisle. There are already in service a similar petrol vehicle and 11 smaller petrol trolleys capable of seating 10 men each. The larger trolleys are for relaying gangs, and the smaller for length gangs.

### Boilers for India

Robert Stephenson & Co. Ltd. has received an order from the Bengal-Nagpur Railway for nine boilers for "C" class superheated 2 ft. 6 in. gauge locomotives.

Sir William Arrol & Co. Ltd. has received an order from the Buenos Ayres Great Southern Railway for two 45-ton and two 10-ton overhead electric travelling cranes.

The City of Nottingham Electricity Department has placed orders, it is understood, for 50 12-ton wooden wagons each with W. Rigley & Sons Ltd. and the Butterley Co. Ltd.

An order has been placed through the Office of the Crown Agents for the Colonies on behalf of the Jamaica Railways for one 60-ft. dia. deck-type turntable with the Patent Shaft & Axletree Co. Ltd.

Alfred Herbert Limited has received an order from the Peruvian Corporation for one No. 13 hexagon turret lathe.

The Bengal & North Western Railway is calling for tenders for 400 four-wheel wagons (I.R.C.A. Type M.C.3) and 800 pairs of wagon wheels and axles. The Rohilkund & Kumaon Railway is also calling for tenders for 40 four-wheeled wagons and 80 pairs of wagon wheels and axles of the same type.

The Associated Equipment Co. Ltd. informs us that the total order it has recently received from the Sydney Transport Board for trolleybus chassis is for 10 of the 664 T A.E.C.-E.E.C. type ; we recorded two chassis in our issue of June 12. The A.E.C. also advises us that the two diesel-engined vehicles it is supplying to the Ottawa Electric Railway Company are Rangers, and not Regals as was stated in the issue already referred to.

A new company, known as Foster, Yates & Thom Limited, with Sir George Cochrane Godfrey, a Director of the Bengal-Nagpur Railway, as Chairman, and a board of engineers, including Mr. Percy Richardson, of the Weyburn Engineering Company, has been formed, and has acquired from the Receiver the old business of Foster, Yates & Thom Limited.

The P.L.M. Railway of France, which, apart from a few suburban trains, has not placed any orders for rolling stock since 1934, has now placed contracts for 70 metal coaches for long-distance trains. Of these 20 will be built by the Société des Usines A. Pétolat, 15 by the Société Baume et Marpent, and 15 by the Société des Établissements Decauville Ainé. The remaining 20 coaches, which will have five third class compartments and a luggage van, have been ordered from the Société des Ateliers de Construction du Nord de la France et des Mureaux. In addition the company has ordered two push-and-pull, nine-coach suburban trains.

# Railway Share Market

Satisfaction with the past week's traffics and the possibility that for the half-year the aggregate increase in the traffics of the main line railways may reach the £2,000,000 level, had a favourable influence on sentiment. Nevertheless improvement in prices has been only fractional, and disappointment was expressed in many quarters that Home railway stocks generally had not responded to the rather more active general market conditions which developed this week. The explanation is, of course, the uncertainty as to the wages question and the possibility that as it may be some time yet before there is a settlement of the latter the half-yearly dividend announcements, due next month, may be on the conservative side.

L.M.S. ordinary improved following publication of the £59,000 traffic increase for the past week, but later the better price was not held and there was a reaction to 22¾. The 4 per cent. and 1923 preferences developed a better tendency in view of the apparently attractive yields and the fact that for the year to date the increase in the railway's traffics amounts to £951,000, which increase represents a very creditable and encouraging achievement. L.N.E.R. stocks improved fractionally on satisfaction with the £24,000 traffic gain for the past week. Chief interest attached to the second preference, hopes of a resumption of dividends on which are growing in some quarters. Southern preferred has improved slightly on balance, but the deferred was little changed despite the £12,000 increase in last week's traffic figures, which, however, was helped by Ascot and the Tattoo at Aldershot. Great Western strengthened fractionally to 47½. London Transport "C" moved up rather sharply on Wednesday.

Among foreign railway stocks a better tendency developed in Argentine stocks than for some time past. B.A. Great Southern rose nearly a point to 16¼ and Central Argentine were half a point better at 9¾; B.A. Pacific were firm at 7½. The prior charges of the Argentine railways also made somewhat improved prices. Cordoba Central first and second debentures were good, San Paulo were steadier and Antofagasta came in for buying on the view that the price had been unduly depressed recently. American railroad stocks were dull in sympathy with Wall Street market conditions. Canadian Pacific ordinary and preference were better.

## Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

| | Railways | Miles open 1935-36 | Week Ending | Traffics for Week: Total this year | Traffics for Week: Inc. or Dec. compared with 1935 | No. of Weeks | Aggregate Traffics to Date: Totals: This Year | Aggregate Traffics to Date: Totals: Last Year | Aggregate Traffics to Date: Increase or Decrease | Shares or Stock | Prices: Highest 1935 | Prices: Lowest 1935 | Prices: June 24, 1936 | Yield (See Note) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | £ | £ | | £ | £ | £ | | | | | |
| South & Central America. | Antofagasta (Chili) & Bolivia | 834 | 21.6.36 | 14,380 | + 3,130 | 25 | 335,970 | 308,040 | + 27,930 | Ord. Stk. | 23 | 14 15/16 | 19⅝ | Nil |
| | Argentine North Eastern | 753 | 20.6.36 | 5,649 | — 2,639 | 51 | 405,907 | 384,738 | + 21,169 | ,, | 7 | 4 | 4½ | Nil |
| | Argentine Transandine | — | — | — | — | — | — | — | — | A. Deb. | 49½ | 30 | 47½ | 8 7/16 |
| | Bolivar | 174 | May, 1936 | 7,900 | + 800 | 22 | 34,800 | 33,400 | + 1,400 | 6 p.c. Deb. | 13 | 5 | 10 | Nil |
| | Brazil | — | — | — | — | — | — | — | — | Bonds. | 14 | 11 | 16 | 3⅛ |
| | Buenos Ayres & Pacific | 2,806 | 20.6.36 | 67,469 | — 20,943 | 51 | 4,313,396 | 4,084,905 | + 228,491 | Ord. Stk. | 101½ | 47⅞ | 8 | Nil |
| | Buenos Ayres Central | 190 | 6.6.36 | $125,000 | + $6,600 | 49 | $5,246,660 | $5,409,400 | — $162,740 | Mt. Deb. | 21 | 10 | 16½ | Nil |
| | Buenos Ayres Gt. Southern | 5,084 | 20.6.36 | 108,221 | — 1,544 | 51 | 6,561,432 | 7,241,787 | — 680,355 | Ord. Stk. | 27 | 13½ | 16½ | Nil |
| | Buenos Ayres Western | 1,930 | 20.6.36 | 36,406 | — 7,123 | 51 | 2,302,472 | 2,327,093 | — 24,621 | ,, | 24 | 10 | 13 | Nil |
| | Central Argentine | 3,700 | 20.6.36 | 118,332 | — 4,250 | 51 | 5,977,162 | 6,222,327 | — 245,165 | ,, | 17⅞ | 7 | 10 | Nil |
| | Do. | — | — | — | — | — | — | — | — | Dfd. | 9 | 3¼ | 6½ | Nil |
| | Cent. Uruguay of M. Video | 273 | 13.6.36 | 10,851 | + 605 | 50 | 557,300 | 671,150 | — 113,850 | Ord. Stk. | 8½ | 3 | 4 | Nil |
| | Do. Eastern Extn. | 311 | 13.6.36 | 1,844 | — 35 | 50 | 104,361 | 96,246 | + 7,415 | — | — | — | — | — |
| | Do. Northern Extn. | 185 | 13.6.36 | 1,707 | + 244 | 50 | 74,252 | 57,337 | + 16,915 | — | — | — | — | — |
| | Do. Western Extn. | 211 | 13.6.36 | 700 | + 66 | 50 | 43,536 | 37,497 | + 6,039 | — | — | — | — | — |
| | Cordoba Central | 1,218 | 20.6.36 | 33,120 | + 1,470 | 51 | 1,427,330 | 1,434,560 | — 7,230 | Ord. Inc. | 4 | 1 | 1½ | Nil |
| | Costa Rica | 188 | Apr., 1936 | 15,044 | + 1,999 | 43 | 142,473 | 162,371 | — 19,898 | Stk. | 35 | 30 | 35 | 5 11/16 |
| | Dorada | 70 | May, 1936 | 13,600 | + 2,700 | 22 | 65,700 | 55,000 | + 10,700 | 1 Mt. Db. | 103⅝ | 102½ | 102½§ | 5⅞ |
| | Entre Rios | 810 | 20.6.36 | 10,023 | — 1,029 | 51 | 547,360 | 615,927 | — 68,567 | Ord. Stk. | 15 | 6½ | 8½ | Nil |
| | Great Western of Brazil | 1,082 | 20.6.36 | 5,700 | + 240 | 25 | 199,500 | 207,300 | — 7,800 | Ord. Sh. | ½ | 5/16 | ½ | Nil |
| | International of Cl. Amer. | 794 | Apr., 1936 | $517,563 | + $61,587 | 17 | $2,080,670 | $1,763,589 | + $317,081 | — | — | — | — | — |
| | Interoceanic of Mexico | — | — | — | — | — | — | — | — | 1st Pref. | ½ | 5/32 | ½ | Nil |
| | La Guaira & Caracas | 22¾ | May, 1936 | 5,505 | + 1,075 | 22 | 22,880 | 19,930 | + 2,950 | Stk. | 8½ | 8 | 8½ | Nil |
| | Leopoldina | 1,918 | 20.6.36 | 16,828 | + 3,680 | 25 | 418,952 | 385,786 | + 33,166 | Ord. Stk. | 8½ | 2½ | 6½ | Nil |
| | Mexican | 483 | 14.6.36 | $266,700 | + $24,900 | 24 | $6,239,500 | $5,728,100 | + $511,400 | ,, | 1½ | 1¼ | ⅝ | Nil |
| | Midland of Uruguay | 319 | May, 1936 | 6,380 | + 53 | 48 | 78,664 | 106,076 | — 27,412 | ,, | 1½ | 1½ | 1½ | Nil |
| | Nitrate | 401 | 15.6.36 | 1,968 | — 6,211 | 24 | 63,702 | 67,104 | — 3,402 | Ord. Sh. | 64/- | 42/- | 21/4 | Nil |
| | Paraguay Central | 274 | 20.6.36 | $3,124,000 | + $1,414,000 | 51 | $114,300,000 | $61,611,000 | + $52,692,000 | Pr. Li. Stk. | 80½ | 60 | 77 | 7 13/16 |
| | Peruvian Corporation | 1,059 | May, 1936 | 79,746 | + 7,931 | 48 | 866,369 | 697,276 | + 169,093 | Pref. | 10⅝ | 6 7/16 | 12 | Nil |
| | Salvador | 100 | 13.6.36 | £8,290 | — £4,235 | 50 | £960,336 | £1,034,332 | — £73,996 | Pr. Li. Db. | 65 | 61 | 40 | 12½ |
| | San Paulo | 153½ | 14.6.36 | 31,740 | + 4,257 | 24 | 706,919 | 551,056 | + 155,863 | Ord. Stk. | 80 | 35 | 54½ | 4 9/16 |
| | Taltal | 164 | May, 1936 | 3,010 | + 330 | 48 | 38,505 | 34,065 | + 4,440 | Ord. Sh. | 1 11/16 | 1⅛ | 1 | 10 |
| | United of Havana | 1,353 | 20.6.36 | 17,958 | — 4,883 | 51 | 1,208,150 | 1,184,063 | + 24,087 | Ord. Stk. | 3 1/16 | 1 | 3 | Nil |
| | Uruguay Northern | 73 | May, 1936 | 817 | + 195 | 48 | 9,110 | 11,484 | — 2,374 | Deb. Stk. | 4½ | 2 15/16 | 4½ | Nil |
| Canada. | Canadian National | 23,618 | 14.6.36 | 667,437 | + 36,807 | 24 | 15,488,600 | 14,504,962 | + 983,638 | — | — | — | — | — |
| | Canadian Northern | — | — | — | — | — | — | — | — 4 p.c. | Perp. Dbs. | 78⅝ | 52½ | 67½ | 5 15/16 |
| | Grand Trunk | — | — | — | — | — | — | — | — | 4 p.c. Gar. | 103⅝ | 93 | 101½ | 3 15/16 |
| | Canadian Pacific | 17,237 | 14.6.36 | 495,400 | + 27,400 | 24 | 11,190,000 | 10,193,400 | + 996,600 | Ord. Stk. | 14 1/16 | 8¾ | 12½ | Nil |
| India † | Assam Bengal | 1,329 | 31.5.36 | 34,672 | + 654 | 9 | 201,630 | 197,905 | + 3,725 | Ord. Stk. | 92⅛ | 77½ | 84½§ | 3 9/16 |
| | Barsi Light | 202 | 31.5.36 | 3,480 | — 622 | 9 | 22,027 | 24,007 | — 1,980 | Ord. Sh. | 105 | 77½ | 72½ | 6⅞ |
| | Bengal & North Western | 2,112 | 31.5.36 | 84,342 | — 4,689 | 9 | 500,704 | 489,131 | + 11,573 | Ord. Stk. | 301½ | 291 | 306§ | 5¼ |
| | Bengal Dooars & Extension | 161 | 31.5.36 | 3,482 | + 458 | 9 | 18,648 | 19,220 | — 572 | ,, | 127½ | 122 | 125½ | 5 9/16 |
| | Bengal-Nagpur | 3,268 | 20.5.36 | 177,675 | — 23,615 | 8 | 898,425 | 950,828 | — 52,403 | ,, | 105 | 100 5/16 | 102½ | 3⅞ |
| | Bombay, Baroda & Cl. India | 3,072 | 10.6.36 | 247,875 | + 14,175 | 11 | 1,888,275 | 1,736,775 | + 151,500 | ,, | 115¼ | 110 | 111⅞§ | 5⅞ |
| | Madras & Southern Mahratta | 3,230 | 31.5.36 | 175,650 | — 7,471 | 9 | 1,023,750 | 1,003,675 | + 20,074 | ,, | 128½ | 113⅞ | 112½ | 8 |
| | Rohilkund & Kumaon | 572 | 31.5.36 | 17,927 | + 1,958 | 9 | 107,646 | 99,213 | + 8,433 | ,, | 294 | 262 | 305½ | 5¼ |
| | South India | 2,531 | 31.5.36 | 119,369 | — 5,139 | 9 | 684,710 | 705,964 | — 21,254 | ,, | 11 9/64 | 104¼ | 103½ | 5 5/16 |
| Various. | Beira-Umtali | 204 | Apr., 1936 | 60,712 | — 10,667 | 30 | 442,973 | 450,161 | — 7,188 | — | — | — | — | — |
| | Bilbao River & Cantabrian | 15 | May 1936 | 1,065 | — 428 | 22 | 7,128 | 8,644 | — 1,516 | — | — | — | — | — |
| | Egyptian Delta | 622 | 10.6.36 | 5,618 | + 456 | 11 | 39,590 | 36,573 | + 3,017 | Prf. Sh. | 2 | 1⅝ | 1¾ | 5 11/16 |
| | Great Southern of Spain | 104 | 13.6.36 | 981 | — 743 | 24 | 26,375 | 45,188 | — 18,813 | Inc. Deb. | 3½ | 2 | 3½ | Nil |
| | Kenya & Uganda | 1,625 | May., 1936 | 238,820 | + 37,731 | 22 | 1,226,510 | 1,129,621 | + 96,889 | — | — | — | — | — |
| | Manila | — | — | — | — | — | — | — | — | B. Deb. | 48 | 36 | 42 | 8 5/16 |
| | Mashonaland | 913 | Apr., 1936 | 100,263 | — 31,988 | 30 | 709,219 | 820,037 | — 110,818 | 1 Mg. Db. | 104¼ | 100 | 103 | 4⅞ |
| | Midland of W. Australia | 277 | Apr., 1936 | 12,597 | + 36 | 43 | 137,461 | 134,787 | + 2,674 | Inc. Deb. | 98¾ | 93 | 93½ | 5 5/16 |
| | Nigerian | 1,905 | 2.6.36 | 34,949 | + 1,207 | 5 | 157,301 | 141,979 | + 15,322 | — | — | — | — | — |
| | Rhodesia | 1,538 | Apr., 1936 | 179,844 | — 25,674 | 30 | 1,297,030 | 1,343,770 | — 46,740 | 4 p.c. Db. | 105½ | 101 | 105 | 3 15/16 |
| | South African | 13,264 | 30.5.36 | 514,039 | — 12,525 | 9 | 4,942,551 | 4,623,633 | + 318,928 | — | — | — | — | — |
| | Victoria | 4,728 | Dec., 1935 | 866,995 | — 3,320 | 26 | 4,826,292 | 4,751,974 | + 74,318 | — | — | — | — | — |
| | Zafra & Huelva | 112 | Apr., 1936 | 9,003 | — 2,584 | 17 | 39,754 | 44,550 | — 4,796 | — | — | — | — | — |

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/10.
† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.
The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value.

# Electric Railway Traction

## Alterations on the Tyneside Lines

THE details of the work involved in altering the position of the conductor rail of the Tyneside electrified lines of the L.N.E.R. to conform with present standard practice (see issue of this Supplement for May 29 and page 1236 of this issue) are worth putting on record. The time for execution of the work was estimated at four days, and Friday to Monday inclusive from May 22 were the days chosen. On Friday the Riverside line, and on Saturday other less important parts of the area, were closed to electric traction and served by steam trains, but the electric service on the principal circular route to the coast was laid off only on Sunday and Monday. Experiments were carried out beforehand to deal with a procedure for which previous experience was not available. It was found that for lifting the rail clear of the insulators and moving it to its new position, $3\frac{1}{4}$ in. nearer the rail, a special type of lifting block was needed, consisting of a rectangular wooden block with a long lever handle. The block was placed partly under the rail with the lever vertical; the lever was then pulled downwards so that the rail was raised on the block which then rested on its side instead of its base; on the opposite or upward side it was then possible, with the aid of pinchbars, to slide the rail the requisite distance. Insulators in their new positions were placed beneath, and an opposite movement of the lever end lowered the rail on to the insulator. In a long length of rail no disconnection of the joints or bonds was entailed; instead the rail was temporarily subjected to twisting effect.

Eight gangs of men were employed daily with the exception of Sunday, when a double shift was worked. Each gang was divided into sub-gangs, A, B, and C, A removing the insulator clips (4 men); B slewing the conductor rail and moving the insulators (7 men); and C refixing the insulator clips in the new position (14 men). In addition, electricians and lookout men were attached to each gang to a total of 5 men. For some weeks beforehand the staff was engaged upon adjusting the connections between third rail and cables, and testing fastenings to insulator clips to ensure that they could be promptly drawn. The main contribution in this respect consisted of providing and fixing one of the two necessary clips in its new position; this was done throughout the area on the side of the conductor rail nearest the track, but during the period of four days it was found that the operation of fixing the remaining clips confirmed the estimate that 40 per cent. of the work could be involved in this item. The work was scheduled for completion at 3 p.m. on Monday, May 25, and was actually completed about 2.15 on that date. Electrical tests were completed by 4 p.m., the running tests by 9 p.m., and the lines were ready for the resumption of electric traffic. The attention bestowed beforehand on detailed organisation by Mr. H. Hills, District Engineer, and by Mr. C. S. Clitheroe, his assistant, enabled the work to be carried out successfully with the minimum interruption of the normal service.

## Italian High Speed Trains

THE first of the six new streamlined 3,000-volt d.c. trains of the Italian State Railways, illustrated below, has run its trials preliminary to going into service between Bologna, Florence, Rome and Naples. Built by the Soc. Ernesto Breda, these trains have six 180 kW. 1,500-volt traction motors arranged in three pairs connected permanently in series, and are suitable for normal operation up to 100 m.p.h. on well-laid lines, but on test a top speed of 106 m.p.h. has been attained. The articulated train seats 35 first and 59 second class passengers and has a dining service. Air-conditioning is provided in the passenger saloons. The body framing is of welded steel and aluminium has been used for the panels and certain fittings.

# PANTOGRAPH CONSTRUCTION AND OPERATION

## *A detailed account of experience in Holland*

*By H. W. BECKERING, Electric Traction Department, Netherlands Railways*

WHEN the 1,500 volts d.c. electric traction was inaugurated on the Netherlands Railways in 1927, the pantographs of all the motor-coaches were equipped with shoes having hard-drawn copper strips of 30 kg./sq. mm. tensile strength, which at that time was the general practice on d.c. systems.

The contact wire on the Netherlands Railways consists principally of two parallel wires of hard-drawn electrolytic copper with a tensile strength of 36-38 kg./sq. mm., and with a c.s.a. of 100 sq. mm. each; these wires are of standardised round profile, and separated by a distance of about 10 cm. (2·5 in.) by spacers, which are supported from one bronze stranded wire of 70 sq. mm. c.s.a. by means of thin wires spaced at distances varying from 2·5 to 7·0 m. (8·2 to 23 ft.). The bronze wire is fixed to each mast, and the latter are spaced 60 to 70 m. (197 to 230 ft.) apart. The contact wires are automatically tensioned by means of weights of 1,000 kg. for each wire every 1,400-1,700 m. (1,500-1,850 yd.), the midpoint being anchored. To reduce friction and wear, grease was applied to the grooves of the pans once a week.

After a few years of service it was stated that the wear of the overhead wire was extraordinarily high, resulting in the necessity of beginning the renewal of the contact wires after 5 to 6 years of service.

Each pantograph was equipped with two shoes, mounted as shown in Fig. 1. The two shoes had together an average life of 9,000 km., or 5,500 miles (in summer a little more, in winter a little less), giving per shoe an average life of 4,500 km. (2,750 miles). The total contact pressure was of the order from 11-12 kg. (25-27 lb.).

Partly this high wear is due to the unfavourable design, because during the run the leading shoe takes practically the whole contact pressure and current while the other shoe is pivoting, because the friction between contact wire and shoe produces a torque, reducing the contact pressure of the second shoe to a low value but giving an extra wear.

The elimination of one shoe and changing the supporting construction as indicated in Fig. 2 was a big improvement; most of the existing parts were used to make the change-over as cheap as possible and the contact pressure could be reduced to 7-8 kg. (16-18 lb.). This construction actually keeps the shoe always parallel to the contact wire and gives a perfect current collection up to 600 amp. at 65 km.p.h. (42 m.p.h.) and diminishing to 200 amp. at 100 km.p.h. (62 m.p.h.). The average life

*Fig. 1a—Typical overhead construction on the 1,500-volt d.c. lines of the Netherlands Railways*

of the shoes was increased to about 12,600 km. (7,800 miles), which means an economy of approximately 180 per cent. on the wear of the shoes, and probably of the same order on the contact wire.

At the same time some test pantographs with carbon-strips were used on the Rotterdam (Hofplein)-The Hague-Scheveningen line. The only reason for making tests with carbon-strips was the decreasing of the wear of shoes and overhead wires by the polishing influence of the carbon. Radio-interference never has been and still is not a reason, because on the Netherlands Railways tests

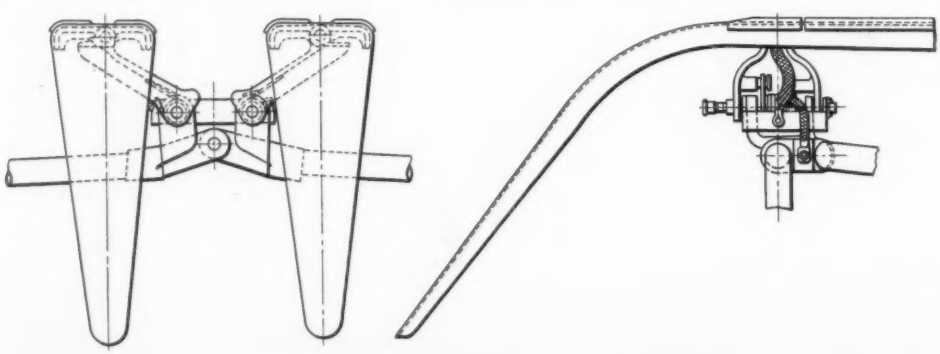


*Fig. 1—Original pantograph shoes as used on the Dutch multiple-unit trains*

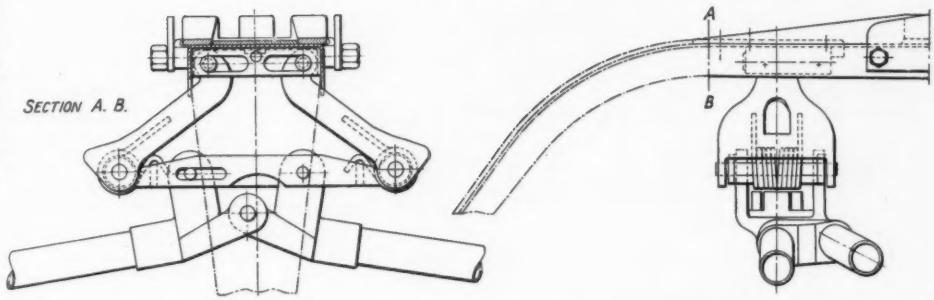



*Fig. 2—Second type of current collector used in Holland. Only one shoe is incorporated and the supporting structure has been changed compared with the type shown in Fig. 1*

have shown that current collection does not interfere with it, and that other influences such as the commutation of motor-generators and high-frequency current rectifiers was responsible. Another advantage connected with the use of carbon strips was found to be that the roof of the coaches did not get as dirty as when using copper pans, the latter giving a heavy deposit of copper grindings mixed with grease.

The construction shown in Fig. 3 was developed by Ing. F. J. Heyligers with the intention always to have a horizontal carbon surface, while keeping to the idea of the necessity of two independent shoes. The profile of the carbon strip was the Siemens-Schuckert type (Fig. 4), which had been in service already on d.c. tramways for fairly low speeds. After the results had proved rather satisfactory, all 23 motor-coaches then in service on the above-mentioned line were equipped with these carbon pans. The life of the first pans (per pair) was about 40,000 km. (24,800 miles) at a maximum speed of 80 km.p.h. (50 m.p.h.), which life increased gradually, the contact wire becoming polished after eliminating the copper pans, till about 125,000 km. (78,000 miles) per pair, or an average life of 62,500 km. (39,000 miles) per shoe; occasionally even 160,000 km. (100,000 miles) per pair was attained, corresponding to an average life of 80,000 km. (50,000 miles) per shoe. Once a week the surface of the carbons was oiled. It must be noted that traffic on this line is not interspersed with steam locomotives, in contradistinction to what is found on the main electrified lines.

Some figures about the contact wire wear on this line

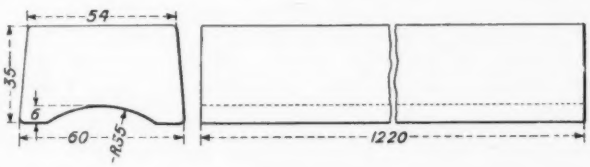



*Fig. 4—Profile of Siemens-Schuckert type of carbon strip*

are given herewith. In the upper graph of Fig. 5 the full line represents the average thickness of the contact wire in September, 1928. This line was obtained in the following way. In each span the thickness of the wire was measured at a certain number of points, the average of which gives one point on the graph in the middle of the span. Through all these points a broken line is drawn. The dotted line indicates the corresponding thickness in September, 1929, after one year's service with

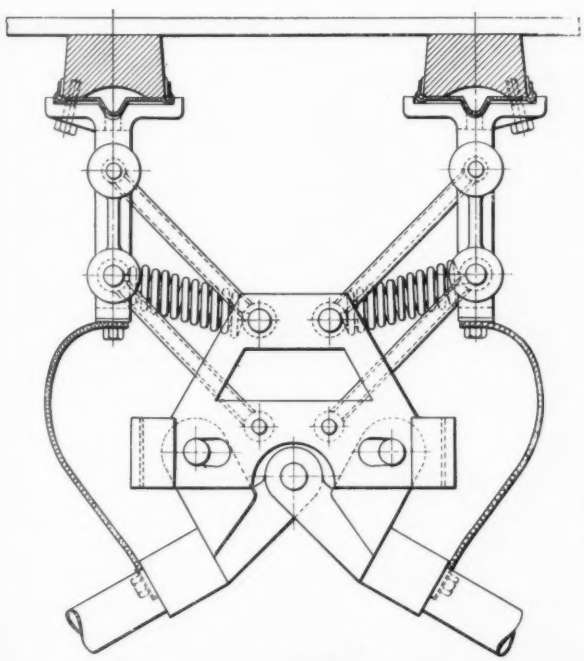


*Fig. 3—A double-shoe type of collector evolved for use with carbon pans*

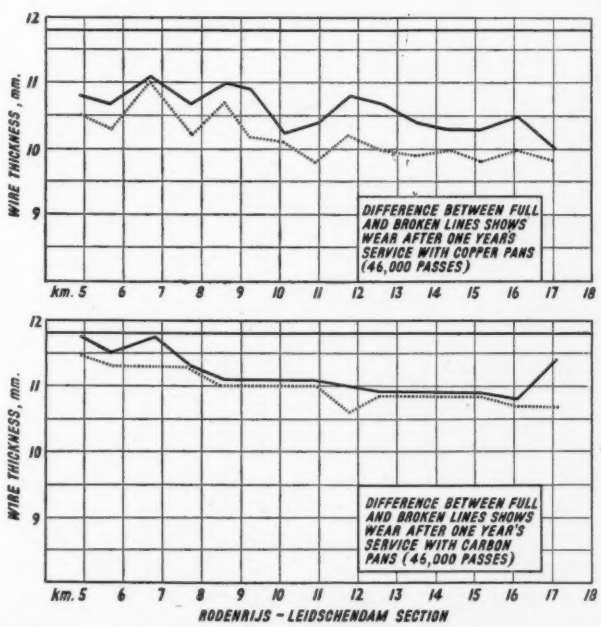

WIRE THICKNESS, mm.
12
11
10
9
DIFFERENCE BETWEEN FULL AND BROKEN LINES SHOWS WEAR AFTER ONE YEARS SERVICE WITH COPPER PANS (46,000 PASSES)
km. 5 6 7 8 9 10 11 12 13 14 15 16 17 18
WIRE THICKNESS, mm.
12
11
10
9
DIFFERENCE BETWEEN FULL AND BROKEN LINES SHOWS WEAR AFTER ONE YEAR'S SERVICE WITH CARBON PANS (46,000 PASSES)
km. 5 6 7 8 9 10 11 12 13 14 15 16 17 18
RODENRIJS - LEIDSCHENDAM SECTION

*Fig. 5—Contact wire wear with copper pans (upper graph) and with carbon strips (lower graph)*

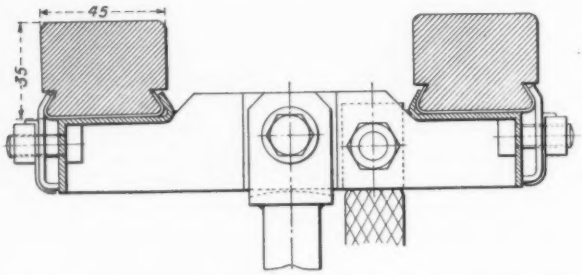



*Fig. 6—Brown-Boveri type of carbon strips used with light-weight pantographs*

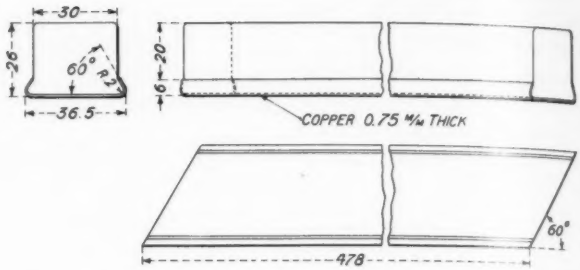



*Fig. 7—Present standard carbon wearing strips of the Netherlands Railways*

copper pans. The difference between the two lines is the wear after 46,000 pantograph passes. This difference is rather irregular, the average being 0·4 mm., giving 0·0087 mm. per 1,000 pantograph passes.

The lower graph indicates the wear on the same line after one year's service with carbon pans from September, 1934 to September, 1935. The difference between the two graphs is evident, the wear in the last case being much more regular and much lower, namely, an average of 0·1 mm., or about 0·00217 mm. per 1,000 pantograph passes. All pantographs used for these tests were of old heavy construction.

## Carbon as a Material

In 1931 the Netherlands Railways ordered some light-weight pantographs from Brown Boveri, which firm was one of the first to recognise the possibility of much more rigid pantograph construction of lighter weight by diminishing the torsion of the main shafts to a minimum and using a much simpler upper frame construction. In view of the early success with carbon shoes these pantographs were equipped with that type of pan of Brown Boveri construction (Fig. 6).

The results with these carbon shoes were fairly good, considering that they were the only ones used on the Amsterdam-Rotterdam line, where the maximum speed is over 100 km.p.h. (62 m.p.h.), while all the other pantographs were equipped with copper strips and there was still a rather intense steam traffic. But they showed that at the higher speed the plain carbon of this construction, as well as in the type shown in Fig. 3 was not able to stand the heavy blows that are inevitable when passing hard spots in the overhead construction which resulted in crumbling of the carbon strips, and even in the possibility of a breakdown.

In consequence the author came to the conclusion that the possibility of using carbon strips on a large scale and for higher speeds could only be satisfactory if the brittle carbon could be protected. After several tests, which showed that metals such as copper, iron, and aluminium could not be used because they were damaged by arcs, the best material was found to be an insulating material consisting of bakelite inlaid with cotton, which has different names, such as canevasit, celeron, and turbax. When using this material, the life of the carbon strips was approximately doubled, which was proved by comparative tests. These tests were repeated when all the motor-coaches were equipped with carbon pans, and the new trials gave about the same result.

## Improvements in Pan Design

The carbon profile used on the Brown-Boveri pantograph had some disadvantages, because the dovetailed foot weakened the carbon too much, so that the rather heavy strips could not be used to the end, and, further, the wear in the middle of the shoe was too high as compared with the ends. The Netherlands Railways therefore made the profile to the design shown in Fig. 7, which is now standard for all pantographs except those shown in Fig. 3, which are now in service only for maximum speeds up to 80 km.p.h. (50 m.p.h.). The advantages of the profile shown in Fig. 7 can be specified as follows: less height, lighter weight, better arrangement on shoe, possibility of wearing them down practically to the metal foot plating, and much cheaper in price. The foot of the carbon strips is enveloped by a copper plate, which reduces the resistance between the carbon and the shoe and gives better results than the galvanised iron plating which formerly was used and often was damaged by corrosion. Also at present, new strips are embedded in grease with graphite, to prevent humidity from entering between shoe and strips, which measure has eliminated every possibility of corrosion.

The Netherlands Railways combined several construc-

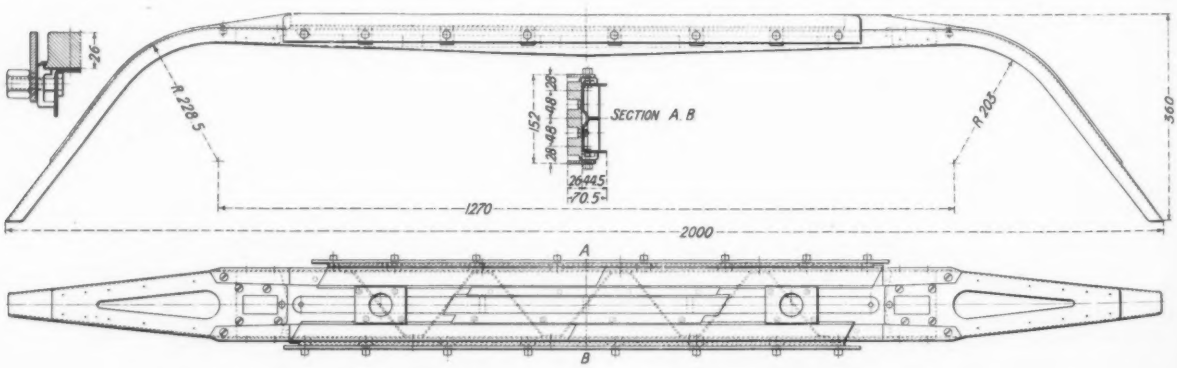



*Fig. 8—Metrovick type of pantograph with carbon pans as used on the Dutch trains*

tions and rebuilt a certain number of Metrovick copper shoes into carbon shoes, with bakelite strips, supported by the construction shown in Fig. 2.

The successful result with these pans made the Railways decide to equip one of the two pantographs of all motor-coaches with a carbon shoe, the copper shoe being used then only in emergency, and since the spring of 1934 only carbon shoes have been placed in service on all the electrified lines, where 153 motor-coaches, or 161 since July, 1935, are in service. Tests in the laboratory of the Netherlands Railways showed that the rough surface of a contact wire is very quickly polished by using carbon as a rubbing material. So in service a quick polishing may be expected, as soon as all pantographs are equipped with carbon. The occasional use of copper strips may not influence the wear very much.

According to the practice of the Netherlands Railways construction of high-speed carbon pans, as shown by the Metrovick type of pantograph in Fig. 8, complies with the following conditions:—

1.—The shoe must be as rigid as possible, but at the same time as light as possible, to be able to follow quickly the difference in height of the overhead wire. A comparison of the weight of the different pantograph constructions (shoes and suspension) in use on the Netherlands Railways is given in the accompanying table.

2.—The carbon strips must be placed so as to have the maximum of carbon in the middle of the shoe, one strip overlapping the others as shown in Fig. 8. The height of the carbon must be as low as possible and the shoe must be of sufficient width to get a stable contact. The carbon shoe of Fig. 8 is only 20 mm. higher than the copper shoe, which practically will give no difficulty for application of carbon shoes anywhere. The carbon must be protected by bakelised strips, as

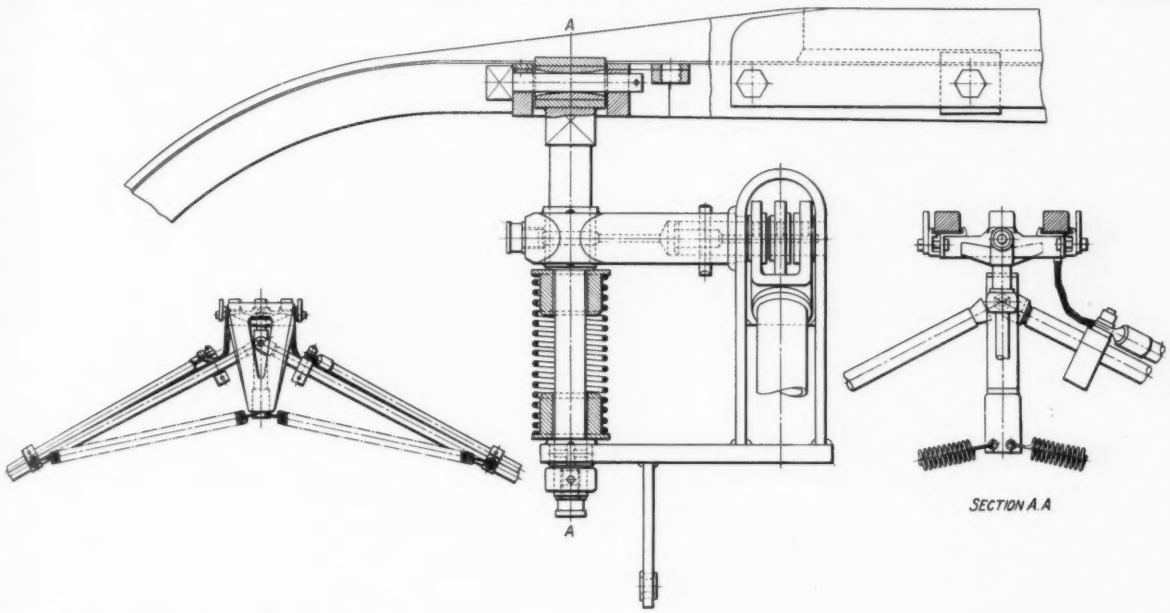



*Fig. 9 (above)—Details of the Brown-Boveri type of light-weight pantograph used on certain of the Dutch multiple-unit trains (See also Fig. 11)*

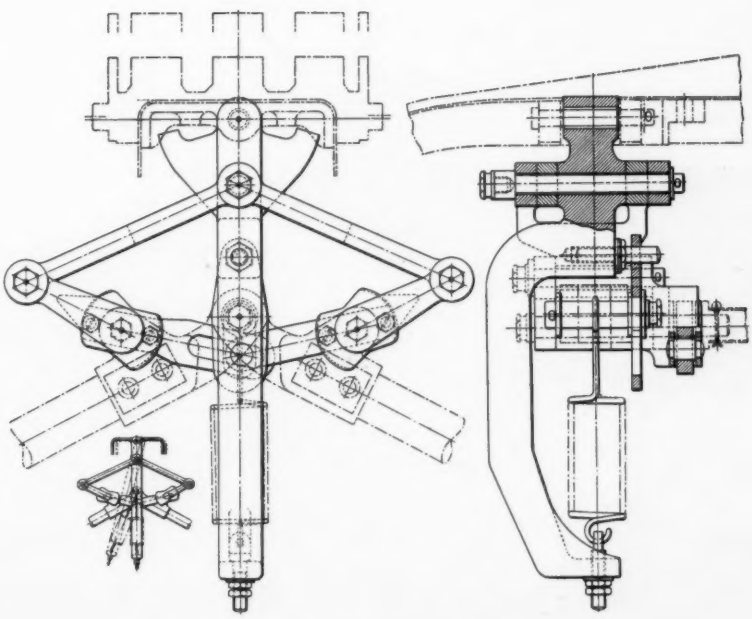


*Fig. 10 (right)—Latest type of current collector of the Metrovick light-weight pantographs. This is the type used on the new Dutch streamlined electric trains*

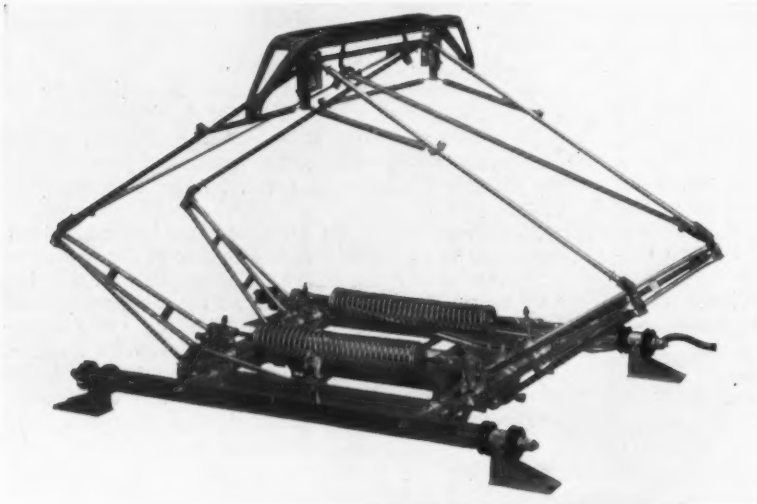


*Fig. 11—Brown-Boveri light-weight pantograph as fitted to Dutch multiple-unit 1,500-volt d.c. trains. The details of the current collector are shown in Fig. 9*

soon as speeds over 80 km.p.h. (50 m.p.h.) are to be exceeded.

3.—The shoe must be supported very elastically on the pantograph structure in order to be free to make motions in three different ways, viz:—

(*a*) The shoe must be free to follow the different positions of the wire (pivoting about a horizontal axis) to be sure of having a good contact; when using bakelite strips this is of very great importance because any difference in the slope of wire and shoe would result in an open circuit and arcing. The contact pressure must be sufficiently high, say 8 to 9 kg. (18-20 lb.). With all the different supporting constructions used on the Netherlands Railways (see below) this condition is fulfilled, witness the absolute flat surface of the carbon and bakelite strips, which latter material wears evenly with the carbon.

(*b*) The shoe must be able to make quick vertical movements, in order to provide for small differences in height of the contact wires at high speeds without necessitating the relatively great masses of the pantograph frame to follow these movements.

(*c*) The shoe must be supported elastically in a horizontal direction to prevent heavy blows from hard supports of the overhead wire construction damaging the current collecting strips.

The conditions mentioned above are fulfilled by the types shown in Figs. 2, 9, and 10, as practice has proved. The type shown in Fig. 2 is used now on all pantographs of heavy construction; Fig. 9 is the Brown-Boveri lightweight pantograph (see also Fig. 11); Fig. 10 shows the latest lightweight Metrovick pantograph, and this company at the request of the Netherland Railways, has fitted a streamlined cover round the lower stationary parts of the pantograph as shown by Fig. 12. This model is used on the new streamlined electric trains which have reached on test runs a top speed of 164 km.p.h. (102 m.p.h.) The current collection of about 200 amp. at this speed was excellent, and the carbon and the bakelite strips were in splendid condition after the test runs.

In service the three different constructions have lasted one as long as the other, which proves that a sufficiently flexible construction of the shoe support will give good results on different types of pantographs. The Netherlands Railways have standardised their carbon-shoes (except those shown in Fig. 3), and the following parts are interchangeable: the complete shoe; the carbon strips (see Fig. 7); the bakelite strips; and the fixing parts for carbon and bakelite.

The bakelised strips are fixed now with mutters made from the same insulating material, to prevent arcs from damaging the fixing bolts and mutters. The maintenance work is very slight and amounts to applying some grease between carbon and bakelite strips, and oiling the surface of the carbon once a week, the grease or oil serving to reduce friction and also to stop the carbon from absorbing

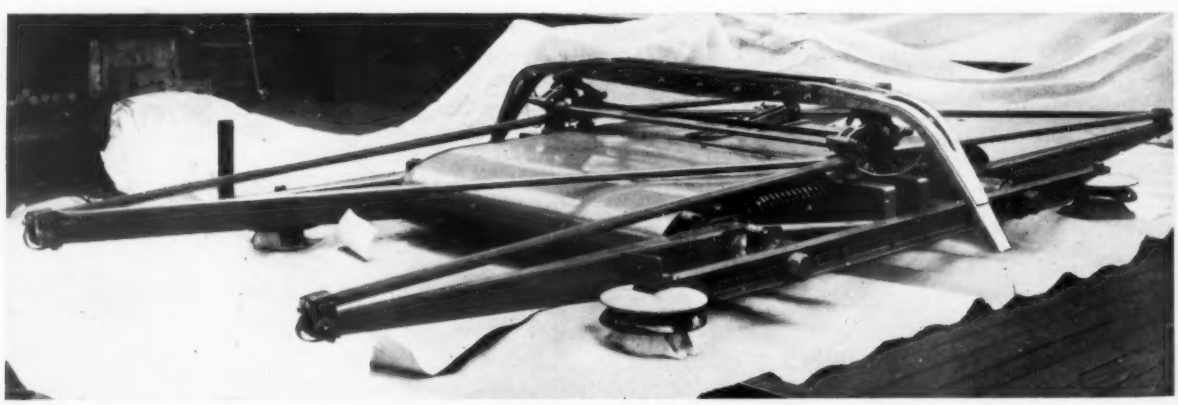


*Fig. 12—The Metrovick pantograph fitted with a streamlined cover over the base*

*Fig. 13—One of the two-car articulated sets of the Netherlands Railways. These trains have Metrovick pantographs with a cowling over the base in order to assist in reducing the air resistance*

too much water, which would shorten its life. In spite of this a big difference in life can be noticed between summer and winter, the average number of km. per shoe in winter being 0·65 to 0·75 that in summer.

The Netherlands Railways have a sharp control on the quality of the carbon required. A strict specification has been drawn up to regulate the quality of the carbon, and it includes the following items. *Porosity*. A sample of 100 cu. cm. is laid in water for 24 hr., after which time the carbon must not have absorbed more than 1·5 grammes of water. *Hardness*. This is controlled by a scratching test and a Brinell test (10-500-30); the material must not exceed 50 Brinell, otherwise the carbon would be too brittle.

The chemical composition, and the control of the structure by microphoto, are included in order to have a comparison with a carbon which is known to be good in service, the exact influence of the different elements not yet being known. As there are many factors influencing the wear, experience is still the best control. The tests on this subject have not yet been finished. The average life taken over a large number of carbon shoes is 67,000 km. (41,500 miles) in summer or 82,000 km. (51,000 miles) as a maximum, and 35,000 km. (22,000 miles) in winter. This is a fairly good result for main lines where the ratio of steam to electric traction is as 25 to 75. From an operating point of view the results obtained are satisfactory, because maintenance of the pantographs has diminished; actually, the staff concerned with this maintenance has been reduced by 50 per cent.

## Contact Line Wear

In the same way as for the line Rodenrijs-Leidschendam (see Fig. 5), there have been plotted curves of the wear on the line from Leiden to The Hague. The upper part of Fig. 14 shows the results of copper shoes from September, 1928, to September, 1929. The wear is of the order of 0·4 mm. for 61,500 pantograph passes or 0·0065 mm. per 1,000 passes. For carbon shoes the difference in thickness of the wires over the period of a year between 1934 and 1935 is 0·1 mm. for 61,500 passes or 0·001625 mm. per 1,000 passes. Fig. 15 shows the results on the Dordrecht-Rotterdam line, where electric traction was started in May, 1934. Since the opening only carbon shoes have been used on this line.

The wear of 0·2 mm. after 54,600 pantograph passes, or 0·00367 per 1,000 passes, seems to be very high, but this is due to the round profile of wire, where the contact between the new wire and the shoe is very small. In this respect the elliptical-wire profile is more favourable.

In so far as the fairly short time that the carbon pantographs have been in service will allow, the conclusion is that the wear of the contact wires has been reduced largely, but at present it is not yet possible to give an exact

DATA RELATING TO PANTOGRAPHS ON THE 1,500-VOLT D.C. MOTOR-COACHES OF THE NETHERLANDS RAILWAYS.

| | Total Weight of Pantograph, kg. | Weight of Shoe(s) per Pantograph, kg. | Weight of Wearing Strips per Pantograph, kg. | Proportionate Weights of Items. | Approx. Ratios | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Manufacturing Costs of New Shoes Complete with Strips per Pantograph. | Costs of Wearing Strips per Pantograph. | Life per Shoe. | Maintenance Costs, excluding Wages, per Pantograph. |
| Heavy pantograph with *two* copper shoes (Fig. 1) | 530 | 2 × 9·5 | 9·6 | 1 | 1 | 1 | 1 | 1 |
| *Idem* with *one* copper shoe (supporting construction as per Fig. 2) | 518·5 | 9·5 | 4·8 | 0·5 | 0·5 | 0·5 | 2·8 | 0·36 |
| *Idem* with *two* carbon shoes (Fig. 3) | 530 | 2 × 9·8 | 7·8 | 0·81 | 0·8 | 6·3 | 13·9 | 0·23 |
| *Idem* with *one* standard carbon shoe (Fig. 2) | 520 | 10·5 | 5·0* | 0·52 | 1·6 | 3·3† | 11·3 | 0·28 |
| Lightweight pantograph with *one* standard carbon shoe | 260 | 10·5 | 5·0* | 0·52 | 1·6 | 3·3† | 11·3 | 0·28 |

* Weight, including copper sheet carriers and bakelised strips.
† Costs, including bakelised strips.

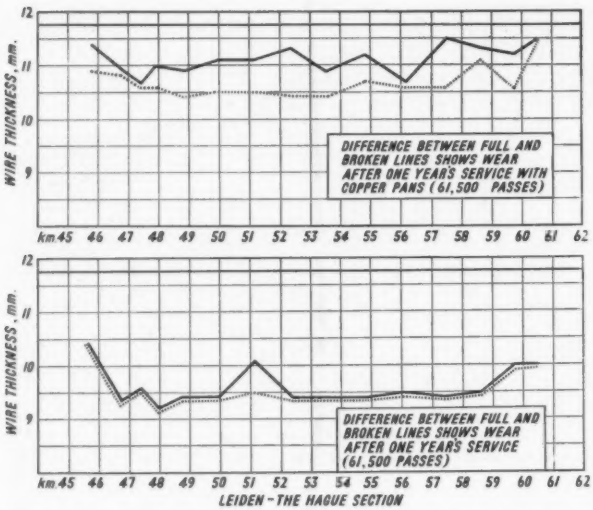

WIRE THICKNESS, mm.
12
11
10
9
DIFFERENCE BETWEEN FULL AND BROKEN LINES SHOWS WEAR AFTER ONE YEAR'S SERVICE WITH COPPER PANS (61,500 PASSES)
km 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62
WIRE THICKNESS, mm.
DIFFERENCE BETWEEN FULL AND BROKEN LINES SHOWS WEAR AFTER ONE YEAR'S SERVICE (61,500 PASSES)
km 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62
LEIDEN - THE HAGUE SECTION

*Fig.* 14—*Contact wire wear on the section from Leiden to The Hague with copper pans* (*upper*) *and carbon shoes* (*lower*)

figure. All in all, the results are such, that the Netherlands Railways are going to equip the second pantograph on each motor-coach with carbon pans, and the new streamlined trains have had them since they were built.

Despite the success of carbon pans, there are one or

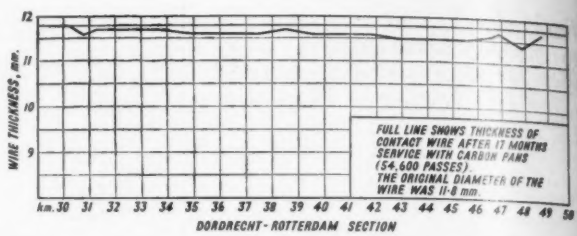
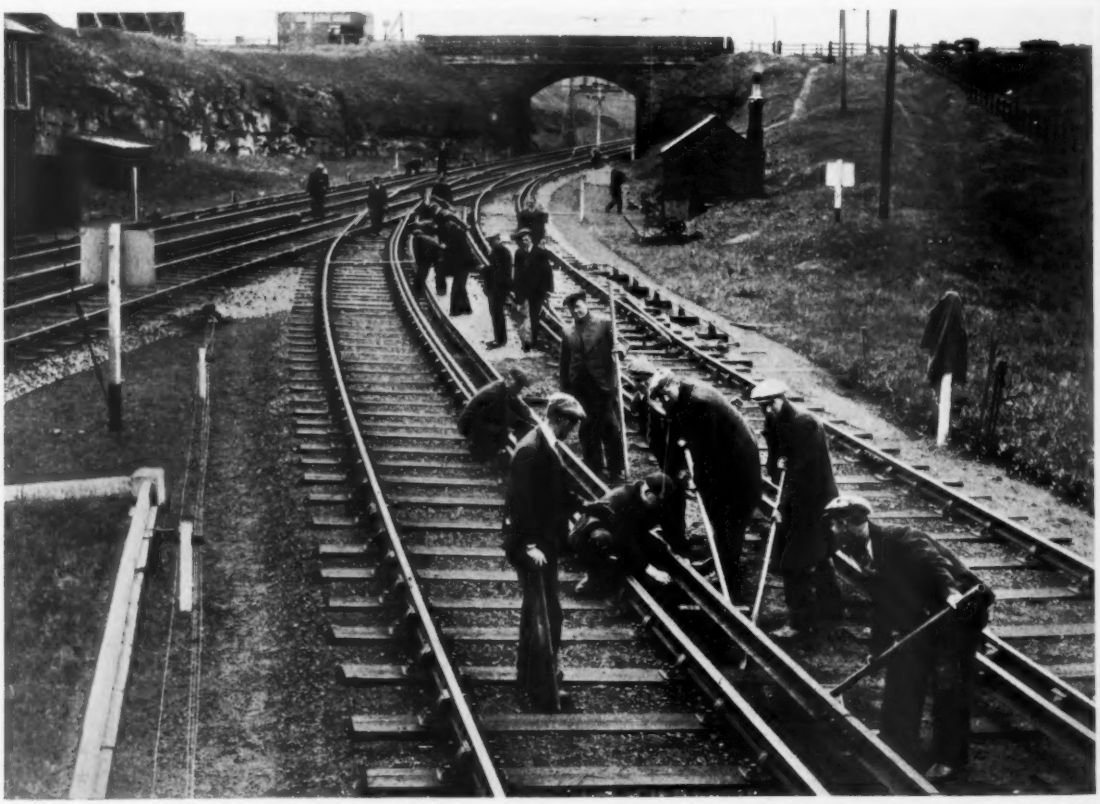

WIRE THICKNESS, mm.
12
11
10
9
FULL LINE SHOWS THICKNESS OF CONTACT WIRE AFTER 17 MONTHS SERVICE WITH CARBON PANS (54,600 PASSES). THE ORIGINAL DIAMETER OF THE WIRE WAS 11·8 mm.
km 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
DORDRECHT - ROTTERDAM SECTION

*Fig.* 15.—*Wear of contact line on the Rotterdam-Dordrecht section, where carbon shoes only have been used*

two disadvantages in the use of this material. First of all the contact drop between copper and carbon is higher than between copper and copper. In this respect it is absolutely necessary to allow no current collection by the pantograph when the normal contact pressure is not secured.

Secondly, the bakelite strips are inflammable. In case of arcing through very rough or dirty contact surface of the wires, or in case of ice-building round the wires, arcing may result in burning of the bakelite strips. In such cases it is advisable to have as many pantographs in service as possible, the first one taking no current from the wires, but only serving to clean the surface from ice, or—if all motor-coaches and locomotives are equipped with two pantographs—having both in service and taking the current from the two pantographs in parallel. The danger of burning bakelite strips is thus reduced to a minimum.



*Moving the conductor rails* $3\frac{1}{4}$ *in. nearer the running rails on the Tyneside electrified section of the L.N.E.R., May* 22-25, 1936

(*See notes on page* 1229)